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Correlation of Hysteroscopy with Histopathology Findings in Various Age Group: Our experience in Secondary Care Hospital

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Abstract

Structural abnormalities of the uterus such as polyps, fibroids, and endometrial hyperplasia are major contributors to abnormal uterine bleeding (AUB), infertility, and reproductive dysfunction. However, diagnostic limitations of ultrasound and blind curettage often delay accurate diagnosis. Hysteroscopy, in combination with histopathology, offers both direct visualization and tissue confirmation, yet few studies have analyzed age-specific pathological pat- terns using this approach. This retrospective study evaluated 797 women who underwent diagnostic hysteroscopy and endometrial biopsy at a secondary care hospital in Oman from 2018 to 2022. Patients were grouped by age: reproductive (15–40 years), premenopausal (41–52), and postmenopausal (≥53). Clinical indications, ultrasonographic findings, hysteroscopic observations, and histopathology reports were analyzed. Pearson's Chi-square tests were used to assess correlations. AUB was the most common indication (43.9%), followed by infertility (29.5%). Hysteroscopy identified endometrial polyps in 40.4% of cases, particularly in pre- and postmenopausal groups. Histopathology revealed proliferative endometrium (41.7%) and secretory endometrium (19.7%) as the most common findings, predominantly in younger women. Significant correlations were observed between hysteroscopic, ultrasonographic, and histopathological findings ($p < 0.001$). Hysteroscopy with histopathological confirmation is a reliable diagnostic approach for intrauterine pathologies, offering age-specific diagnostic clarity. Its integration into routine gynecological assessment, especially in secondary care settings, may lead to more personalized and effective clinical management.

Keywords: Hysteroscopy, Histopathology, Intrauterine Pathology, Abnormal Uterine Bleeding, Endometrial Polyp, Age-Specific Diagnosis.

Introduction

Intrauterine pathologies are a significant global concern in women's health, contributing to abnormal uterine bleeding (AUB), infertility, and repeated pregnancy loss. These conditions disrupt quality of life and reproductive function across all age groups. Early detection is critical, yet remains challenging due to overlapping symptoms and limitations in current diagnostic practices. Traditionally, imaging techniques such as transvaginal ultrasound and blind endometrial curettage have been used to investigate suspected intrauterine abnormalities. While these methods are widely available, they often miss focal lesions or provide inconclusive results. In contrast, hysteroscopy offers direct visualization of the uterine cavity and enables targeted biopsies, leading to more precise diagnoses [1,2]. When paired with histopathology, it provides a gold standard approach to diagnosing structural and functional abnormalities such as endometrial polyps, fibroids, hyperplasia, and synechiae. Despite its diagnostic superiority, hysteroscopy is not uniformly applied in age-stratified protocols for AUB [2,3], and many clinicians rely solely on imaging or blind biopsy. Furthermore, limited data exist on how intrauterine pathologies vary across a woman's lifespan. This leads to generalized clinical decisions that may overlook the specific risks or trends unique to reproductive, premenopausal, and postmenopausal age groups.

While several studies have explored the correlation between hysteroscopic and histopathological findings [2], few have analyzed these relationships across different age cohorts [4-6].

Most existing literature focuses either on AUB or infertility as isolated phenomena, without considering age-dependent trends in uterine pathology presentation. [7,8]observed that diffuse endometrial hyperplasia is more prevalent during early reproductive years, chronic endometritis in the late reproductive period, and polyps during the menopausal transition. Similarly [9,10]. highlighted how hysteroscopy can identify abnormalities missed by histopathology alone. However, these studies did not examine pathology distribution across clearly defined age groups within the same institutional setting using integrated diagnostic modalities. In Oman's secondary healthcare settings—such as Ibri Regional Hospital—diagnostic hysteroscopy is increasingly available, yet its usage patterns and diagnostic yield across age groups have not been systematically studied. This gap has implications for clinical decision-making and resource utilization in a rapidly evolving healthcare system. This study aims (1) to identify intrauterine pathology via hysteroscopy in three distinct age groups: reproductive (15–40 years), premenopausal (41–52 years), and postmenopausal (≥53 years), and (2) to correlate hysteroscopic findings with histopathological diagnoses. In this paper, we present a five-year retrospective analysis of 797 cases at a secondary care hospital in Oman. By integrating clinical, hysteroscopic, and histopathological data, we reveal how intrauterine pathologies vary with age and provide evidence to support more personalized, age-aware diagnostic strategies in gynecologic practice.

Materials and Methods

This study employed a retrospective observational design to investigate the diagnostic correlation between hysteroscopic and histopathological findings among women of dif- ferent age groups presenting with intrauterine abnormalities. The research was con- ducted at Ibri Regional Hospital, a secondary care center in the Al Dhahirah region of Oman, and included patient records over a five-year period from January 2018 to De- cember 2022. The study targeted women who were admitted to the hospital for diag- nostic hysteroscopy and endometrial biopsy during the specified timeframe. Participants were stratified into three age-based cohorts to explore potential variations in intrauterine pathology across different life stages. Group 1 comprised reproductive- aged women between 15 and 40 years, Group 2 included premenopausal women aged 41 to 52 years, and Group 3 consisted of postmenopausal women aged 53 years and above. Inclusion criteria encompassed all patients who underwent both hysteroscopic examination and endometrial sampling with complete clinical records. Patients with incomplete data, previously diagnosed malignancies, or who underwent therapeutic hysteroscopy alone were excluded to maintain uniformity of diagnostic intent. Data collection was carried out using a structured data abstraction form (proforma), which was meticulously designed to capture both clinical and diagnostic parameters. Extracted data included demographic information (age, parity), medical history (including history of hormonal treatment and infertility), menstrual pattern (regularity, last menstrual period), clinical indications for hysteroscopy, and ultrasound findings (e.g., endometrial thickness, presence of polyps or fibroids). Intraoperative hysteroscopic findings were recorded, such as presence of cervical polyps, submucous myomas, synechiae, atrophic or fluffy endometrium, and any technical difficulties in cavity distension. Histopathological results from endometrial biopsy were then matched to the hysteroscopic findings to determine concordance and pattern distribution.

Data were analyzed using IBM SPSS version 18. Descriptive statistics were calculated to summarize patient characteristics, frequencies of indications, and types of intrauter- ine pathology identified by ultrasonography, hysteroscopy, and histopathology. Com- parative analyses were conducted to assess the distribution of findings across age groups. Pearson's Chi-square test was used to evaluate statistical associations between categorical variables, particularly between hysteroscopic and histopathological out- comes and their relation to patient age and clinical indication. Statistical significance was set at $p < 0.05$. Ethical approval for this study was obtained from the institutional research and ethics board. Patient confidentiality and data anonymity were strictly maintained throughout the study. Data access was restricted to the research team, and all extracted records were stored securely on password-protected systems. As a retrospective review of anonymized medical data, the study posed minimal risk to participants and was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

Results

A total of 797 women underwent diagnostic hysteroscopy and histopathological evalu- ation between 2018 and 2022 at Ibri Regional Hospital. These patients were categorized into three age groups: reproductive age (15–40 years), premenopausal age (41–52 years), and postmenopausal age (≥53 years).

Trends in Age Group Distribution

Over the five-year period, the 15–40 age group represented the largest proportion of cases (46%), followed by the 41–52 group (39%), and the ≥53 group (15%). Figure 1 illustrates the annual trend of hysteroscopy cases by age group. The 15–40 cohort displayed a drop in 2020, likely related to pandemic-related service interruptions, followed by a sharp rebound in subsequent years. The postmenopausal group showed a peak in 2019 and maintained a stable rate thereafter.

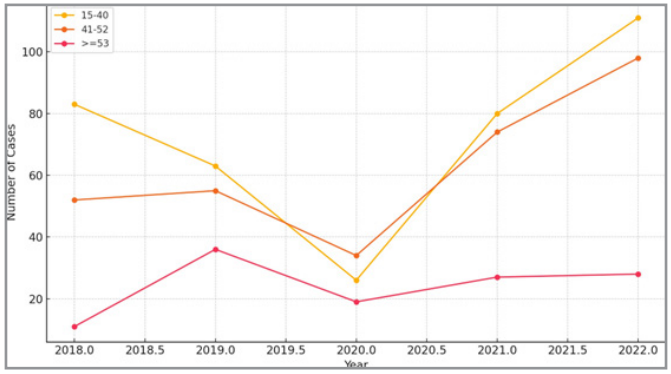

Figure 1: Age Group Distribution of Hysteroscopy Cases (2018–2022)

Table 1: Age Group Distribution of Hysteroscopy Cases (2018–2022)

Year	Reproductive (15–40 years)	Premenopausal (41–52 years)	Postmenopausal Cases (≥53 years)	Total
2018	83	52	11	146
2019	63	55	36	154
2020	26	34	19	79
2021	80	74	27	181
2022	111	98	28	237
Total	363 (46%)	313 (39%)	121 (15%)	797 (100%)

Clinical Indications for Hysteroscopy

The most common indication across all age groups was abnormal uterine bleeding (AUB), which accounted for 43.9% (n = 350) of all cases. AUB was particularly prev- alent in the premenopausal and postmenopausal groups. Infertility was the second most frequent indication (29.5%), almost exclusively seen in women aged 15–40. Other less frequent indications included retained products of conception (RPOC), postmenopausal bleeding, endometrial polyps, and intrauterine device (IUCD) evaluation.

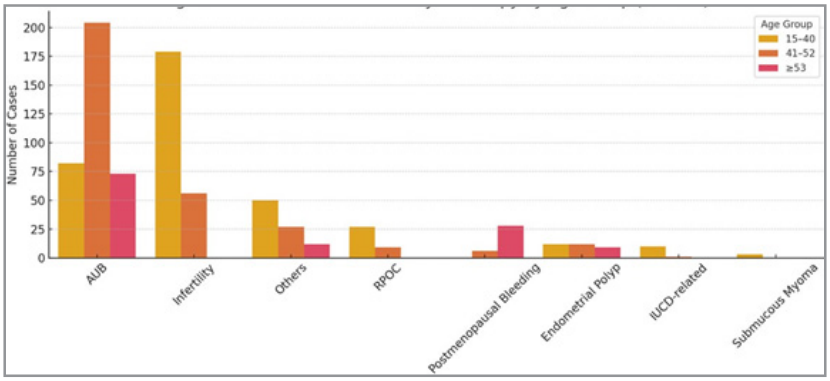

Figure 2: Clinical Indications for Hysteroscopy by Age Group

Summary of Indications and Age Group Distribution

Below is the tabulated distribution of clinical indications across the three age cohorts:

Table 2: Clinical Indications for Hysteroscopy by Age Group

Indication	15–40	41–52	≥53
Abnormal Uterine Bleeding (AUB)	82	204	73
Infertility	179	56	0
Others	50	27	12
Retained Products of Conception (RPOC)	27	9	0
Postmenopausal Bleeding	0	6	28
Endometrial Polyp	12	12	9
IUCD-related	10	1	0
Submucous Myoma	3	0	0

These findings emphasize distinct clinical patterns across age groups: infertility domi- nates reproductive years, AUB rises in midlife, and postmenopausal bleeding becomes more prominent in older women.

Ultrasonographic, Hysteroscopic and Histopathological Findings

Findings from ultrasonography revealed that 44.0% (n = 307) of cases had a normal endometrium, while 35.5% (n = 248) showed a thickened endometrium. Submucous fibroids and endometrial polyps were detected in 14.0% and 10.9% of cases respec- tively. However, hysteroscopic assessment showed a significant diagnostic shift, with normal endometrium being the most frequently identified pathology (47.1%, n = 293), followed by Endometrial polyp (40.4 %, n = 251) and thick endometrium (11.3%, n = 70). Submucous fibroids were detected in 6.8% (n = 42).

Histopathology confirmed that proliferative endometrium was the predominant diag- nosis, accounting for 41.7% (n = 332) of all samples. Secretory endometrium was pre- sent in 19.7% (n = 157), and endometrial polyps in 9.8% (n = 78). Less common diag- noses included atrophic endometrium (2.5%), endometrial hyperplasia (0.6%), and a small number of cases classified as others.

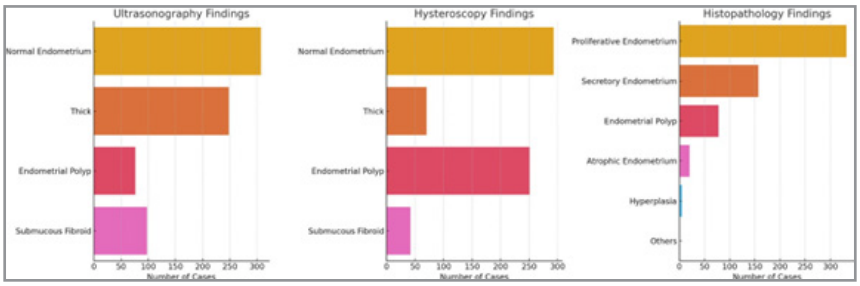

Figure 3: Diagnostic Modalities Summary

Table 3: Diagnostic Modalities Summary

Modality	Finding	Cases (n)	Percentage (%)
Ultrasonography	Normal Endometrium	307	44.0
	Thickened Endometrium	248	35.5
	Submucous Fibroid	98	14.0
	Endometrial Polyp	76	10.9
Hysteroscopy	Normal Endometrium	293	47.1
	Endometrial Polyp	251	40.4
	Thick Endometrium	70	11.3
	Submucous Fibroid	42	6.8
Histopathology	Proliferative Endometrium	332	41.7
	Secretory Endometrium	157	19.7
	Endometrial Polyp	78	9.8
	Atrophic Endometrium	20	2.5
	Hyperplasia	5	0.6

Correlation Between Diagnostic Methods

Statistical analysis using Pearson's Chi-square test showed a strong correlation between ultrasonography/hysteroscopy and histopathology findings ($\chi^2 = 261.256$, df = 48, $p < 0.001$). Similarly, clinical indications such as AUB, infertility, and postmenopausal bleeding were significantly associated with specific histopathological outcomes ($\chi^2 = 148.533$, df = 60, $p < 0.001$).

These findings underscore the diagnostic superiority of hysteroscopy over ultrasonog- raphy, particularly in detecting focal lesions such as polyps and fibroids that are often missed on imaging. Furthermore, histopathology remains essential for definitive diag- nosis, particularly in differentiating between proliferative, secretory, hyperplastic, and atrophic changes.

Discussion

This study sought to identify intrauterine pathologies using hysteroscopy across differ- ent age groups and assess how these findings correlate with histopathological outcomes. The data revealed a clear age-related pattern in both hysteroscopic and histopathologic findings. Endometrial polyps were more commonly visualized in premenopausal and postmenopausal women, while proliferative endometrium dominated histopathological results in younger, reproductive-aged patients (Table 3). The distribution of hysteroscopy cases by age group and year (Table 1, Figure 1) shows a consistent trend: women aged 15–40 were the most frequent group undergoing diagnostic hysteroscopy, peaking in 2022. However, premenopausal women (41–52 years) showed the highest incidence of AUB (Table 2), emphasizing this group's clinical vulnerability.

Ultrasonographic findings showed normal endometrium in 44.0% of cases, whereas hysteroscopy detected endometrial polyps in 40.4%—nearly four times the rate ob- served via ultrasound (Table 3). This discrepancy underlines the diagnostic limitations of ultrasonography and the added value of hysteroscopy for identifying focal lesions. Moreover, Pearson Chi-square analysis confirmed strong statistical significance be- tween hysteroscopic and histopathological findings ($\chi^2 = 261.256$, df = 48, $p < 0.001$), and between clinical indications and pathology ($\chi^2 = 148.533$, df = 60, $p < 0.001$), val- idating the reliability of hysteroscopy as a diagnostic tool. A notable yet unexpected result was the low prevalence of endometrial hyperplasia (0.6%) and atrophic endometrium (2.5%) (Table 3), even in the postmenopausal group. Given the well-documented hormonal and atrophic changes in this cohort, the rarity of these findings may reflect sampling limitations, pre-screening exclusions, or true population differences. It also raises the possibility that some cases remain undetected by blind biopsy, reaffirming the importance of hysteroscopy in visual diagnosis. This study has significant implications for clinical practice in secondary care settings. The large number of polyps detected via hysteroscopy, which were missed by ultra- sound (Figure 3), supports the integration of hysteroscopy into routine evaluation of AUB and infertility—especially in pre- and postmenopausal patients. These findings also emphasize the importance of age-stratified diagnostic pathways, challenging the uniform application of current gynecological diagnostic protocols.

To our knowledge, this is the first large-scale, age-stratified study conducted in Oman that evaluates hysteroscopy and histopathology over a five-year period (2018–2022). The inclusion of

over 797 cases adds statistical weight to the conclusions, while the age-segmented analysis provides new insights into how intrauterine pathologies evolve across life stages (Tables 1–3, Figures 1–3). These contributions add to regional and global literature on personalized gynecological diagnostics. Several limitations must be acknowledged. This was a retrospective study, dependent on the accuracy and completeness of patient records. The exclusion of patients under- going therapeutic hysteroscopy or those with known malignancy may limit generalizability. Also, the study did not include hormonal or metabolic data, which could influence endometrial pathology. Finally, follow-up outcomes were not tracked, which would be necessary to evaluate the impact of hysteroscopic diagnosis or treatment efficacy.

Future studies should employ a prospective, multi-center design, including therapeutic outcomes, hormonal profiling, and patient-reported symptom resolution. A compara- tive cost-effectiveness analysis of ultrasound vs. hysteroscopy could also help refine diagnostic protocols, particularly in resource-limited settings.

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