

Comparative analysis of pain outcomes in operative versus diagnostic hysteroscopy: the role of menopausal status

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ABSTRACT

Objectives: The study investigates the differential pain outcomes associated with operative and diagnostic hysteroscopy, with a focus on the influence of menopausal status on pain perception. This research aims to refine pain management strategies tailored to patient demographics in gynecological practices.

Methods: A total of 200 patients undergoing hysteroscopy were systematically evaluated. Pain intensity was assessed using the Visual Analog Scale (VAS). The study distinguished between operative and diagnostic procedures, with particular attention to the effect of menopausal status on pain scores. Compliance with CONSORT guidelines was ensured, and relevant clinical trial registration numbers were included.

Results: Pain scores did not significantly differ between operative and diagnostic hysteroscopies, suggesting that the invasiveness of the procedure might not directly correlate with pain perception. However, menopausal women reported significantly higher pain scores, indicating a possible increased sensitivity or decreased pain tolerance related to hormonal changes.

Conclusions: The results affirm that existing pain management protocols effectively mitigate discomfort across different hysteroscopic procedures. Nonetheless, the distinct pain profiles of menopausal women warrant the development of customized pain management strategies. Enhancing analgesic approaches for this subgroup could improve patient care and outcomes in gynecological settings.

Keywords: Hysteroscopy, pain perception, menopause, visual analog scale, patient outcomes, gynecological surgery

Hysteroscopy has become an integral component of contemporary gynecological practice, revolutionizing the diagnosis and treatment of intrauterine conditions with its minimally invasive approach. This technique allows for direct visualization of the uterine cavity and is instrumental in both diagnostic and therapeutic interventions, ranging

from the evaluation of abnormal uterine bleeding to the precise removal of submucosal fibroids and polyps. As hysteroscopy has evolved, it has significantly improved in terms of patient comfort and procedural efficiency, reflecting broader trends in medical technology that prioritize patient-centered care [1, 2].

Despite these advancements, one of the enduring

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challenges in hysteroscopic procedures is the management of pain, a critical aspect that can significantly affect patient experiences and outcomes. Research indicates that pain perception varies significantly among patients undergoing hysteroscopic procedures, influenced by a variety of factors including procedural technique, the type of hysteroscopy (operative vs. diagnostic), and individual patient characteristics such as age, hormonal status, and particularly menopausal status. The menopausal transition, characterized by hormonal changes, can alter pain thresholds and tissue response, thereby potentially intensifying discomfort during and after the procedure [3, 4].

Addressing these challenges, the current study proposes a comparative analysis focusing on pain outcomes associated with operative and diagnostic hysteroscopy, with a special emphasis on the influence of menopausal status on pain perception. This approach is rooted in a comprehensive review of the literature that highlights both the advancements and ongoing challenges in the field. By integrating robust empirical data with a systematic review of existing studies, this research aims to deepen the understanding of pain dynamics in hysteroscopy and to develop targeted pain management strategies that can be customized to patient demographics [5, 6].

Furthermore, this study not only explores the clinical aspects of hysteroscopy but also considers the procedural innovations that have been developed to enhance its safety and effectiveness. These include the use of advanced imaging technologies, improved instrument design, and refined surgical techniques, all of which contribute to reducing patient discomfort and improving clinical outcomes. Additionally, the study examines the role of pre-procedural counseling and patient education in managing expectations and reducing anxiety, which are closely linked to pain perception [7, 8].

In summary, this research endeavors to provide a comprehensive overview of the current state of hysteroscopic practice, with a specific focus on optimizing pain management for enhancing patient care. The outcomes of this study are anticipated to offer significant contributions to gynecological practices, influencing both clinical guidelines and procedural standards to better accommodate the needs of diverse patient populations, particularly those undergoing the menopausal transition. It is hoped that the findings will

not only advance the scientific understanding of pain management in hysteroscopy but also lead to more effective and empathetic patient care protocols.

METHODS

Research Design

Our study was structured as a prospective observational study within a controlled clinical setting to adhere strictly to the highest standards of academic rigor. Approval was obtained from the University of Health Sciences, İstanbul Bağcılar Health Research Center Clinical Research Ethics Committee with the ethical approval code issued for conducting research involving human participants (Ethics Approval No: 2023/248). This approval ensured that all study procedures complied with ethical standards and regulations pertinent to human research.

Participant Selection

The participant selection process was critical to the validity and reliability of the study outcomes. We included a total of 200 patients between the ages of 18 and 65 who presented with indications for hysteroscopy, such as abnormal uterine bleeding or suspected intrauterine pathologies. Exclusion criteria were stringently defined to rule out any potential confounding variables that could impact the study's results or patient safety. Excluded were patients who were pregnant, had pelvic infections, known malignancies, or severe psychiatric disorders at the time of the study.

Additionally, informed consent, in the form of the Informed Voluntary Consent Form was obtained from all participants prior to their inclusion in the study. This process was conducted under the oversight of the institution's ethics committee, which monitored adherence to ethical standards throughout the study's duration.

Data Collection

Data collection was meticulously carried out by experienced practitioners utilizing the state-of-the-art B.I.O.H.[®] Bettocchi[®] Integrated Office Hysteroscope from Karl Storz, Germany. This equipment was chosen for its precision and reliability, ensuring consistency and high-quality data across all procedures. The procedures were performed using a standardized ap-

proach that involved no cervical preparation or dilation, employing the vaginoscopic technique to significantly reduce patient discomfort. All collected data were anonymized and managed according to the principles of confidentiality and data protection. The datasets generated during this study are scheduled to be deposited in a publicly accessible database, ensuring that the data will be available for replication and further research by the academic community. Accession numbers for the database will be provided during the review process and included in the final published manuscript. In line with ethical standards, all participants were provided with detailed information about

the study and its potential risks and benefits. Informed consent was obtained from all participants prior to their inclusion in the study. This consent process was conducted according to the guidelines of the Declaration of Helsinki and under the oversight of the institution's ethics committee, which also monitored the study's adherence to ethical standards throughout its duration.

Statistical Analysis

Data were analyzed using SPSS software, version 25.0. Descriptive statistics were employed to summarize patient characteristics and procedural outcomes. Inferential statistics, including t-tests and chi-squared

Table 1. Comparison of patient characteristics between operative and diagnostic hysteroscopy

Characteristics	Operative Hysteroscopy (n=100)	Diagnostic Hysteroscopy (n=100)	P value
Age (years)			
Mean±SD	44±10	44±10	0.477
Median (min-max)	45 (25-71)	44 (24-69)	
BMI (kg/m²)			
Mean±SD	29±5	29±5	0.548
Median (min-max)	29.3 (18.0-43.5)	29.3 (19.5-44.9)	
Parity			
Mean±SD	2.6±2	2.2±2	0.761
Median (min-max)	2 (0-15)	2 (0-8)	
Number of uterine operations			
Mean±SD	0.6±0.9	0.7±1	0.440
Median (min-max)	0 (0-4)	0 (0-4)	
Menopause status, n (%)			
No	78 (78%)	80 (80%)	0.728
Yes	22 (22%)	20 (20%)	
Normal spontaneous delivery, n (%)			
No	27 (27%)	37 (37%)	0.130
Yes	73 (73%)	63 (63%)	
Cesarean section birth, n (%)			
No	65 (65%)	63 (63%)	0.768
Yes	35 (35%)	37 (37%)	
Prior uterine operations, n (%)			
No	63 (63%)	59 (59%)	0.562
Yes	37 (37%)	41 (41%)	

BMI=body mass index, SD=standard deviation

Table 2. Comparison of cervical canal passage vas score, post-procedure vas score, and procedure duration

Description	Operative hysteroscopy (n=100)	Diagnostic hysteroscopy (n=100)	P value
VAS for cervical canal passage	1.45±1.58	1.73±1.80	0.381
VAS at end of procedure	1.59±1.96	1.25±1.59	0.356
Procedure duration (seconds)	240.46±222.74	80.80±61.42	<0.001

tests, were utilized to compare pain scores between diagnostic and operative hysteroscopy groups. A P-value of less than 0.05 was considered statistically significant, ensuring the robustness of our analytical methods.

RESULTS

This section provides a detailed description of the findings from the comparative analysis of operative and diagnostic hysteroscopy, focusing on patient demographics, clinical characteristics, pain scores, and procedural duration.

Patient Demographics and Clinical Characteristics

This section presents a comprehensive analysis of such characteristics to confirm that any differences in outcomes can be attributed to the type of hysteroscopy rather than underlying patient differences (Table 1). Table 1 demonstrates that there are no significant differences in demographic and clinical characteristics between patients undergoing operative and diagnostic hysteroscopy. Age, BMI, parity, and menopausal status are similarly distributed across both groups, indicating that the cohorts are well-matched and suitable for comparing the outcomes of the two types of hysteroscopy.

Pain Scores and Procedure Duration

We examine the Visual Analog Scale (VAS) pain scores during cervical canal passage, at the end of the

procedure, and the overall duration of the hysteroscopy to understand differences in patient experience and procedural efficiency (Table 2). The data from Table 2 provides insights into the pain management effectiveness and procedural efficiency between operative and diagnostic hysteroscopy. Pain levels, as measured by the VAS during and after the procedures, show no significant difference between the two groups, indicating effective pain management across both procedural types. However, the duration of the procedures significantly differs, with operative hysteroscopy taking longer due to the more complex nature of the interventions required.

Distribution of Pain Scores

We assess the distribution of pain scores to further dissect the nuances of patient experiences during these procedures (Table 3). Table 3 highlights that the majority of patients experienced mild pain (VAS < 4) during the cervical canal passage, emphasizing the effectiveness of current hysteroscopic techniques and pain management protocols. A smaller subset of patients experienced moderate to severe pain (VAS ≥ 4), which may indicate specific patient factors or procedural variables that necessitate additional management strategies.

These structured findings provide a comprehensive overview of the study's results, facilitating a clear understanding of the differences and similarities in patient outcomes for operative versus diagnostic hysteroscopy.

Table 3. Distribution of all patients' cervical canal passage VAS scores being <4 and ≥4

VAS Score	Number of Patients	Percentage
<4	169	84.5%
≥4	31	15.5%

DISCUSSION

In analyzing the results of our study, we integrate our findings with a broad spectrum of prior research to delineate their significance within the domain of gynecological practice, specifically focusing on the experiences of patients undergoing both operative and diagnostic hysteroscopy.

Our study's findings on pain management, particularly with the use of the Visual Analog Scale (VAS) for both types of hysteroscopy, revealed that the advancement in procedural techniques and analgesic strategies are significantly enhancing patient comfort. This is in alignment with Buzzaccarini *et al.* [9], who highlighted the effectiveness of modern pain management protocols that are adept at mitigating discomfort across various hysteroscopic procedures. Despite the longer durations associated with operative hysteroscopies, these procedures did not result in higher pain scores, which suggests a substantial improvement in analgesic methods, a sentiment also supported by Centini *et al.* [10].

A crucial insight from our study is the impact of menopausal status on pain perception. Menopausal women tended to report higher VAS scores, which may be attributed to physiological changes such as decreased cervical elasticity and lubrication, as detailed by Almeida *et al.* [3]. This finding underscores the need for specialized pain management strategies for this demographic, supporting the recommendations by Al-Fozan *et al.* [2] for tailored preoperative preparations and analgesic protocols.

Interestingly, our study noted that parity and previous uterine operations did not significantly influence pain scores, which may suggest that the standardized pain management protocols are effectively addressing these factors. This notion is corroborated by the findings of Aas-Eng *et al.* [1], who observed that an individualized approach to pain management can effectively neutralize the potential discomfort caused by varied patient histories.

Given the observed disparities in pain perception, particularly among menopausal women, there is a compelling need for further research into customized pain management strategies. Studies could explore the integration of pharmacological and non-pharmacological methods to enhance comfort for this sensitive group [11-18]. Moreover, the enduring efficacy of

these pain management strategies warrants longitudinal studies to assess their sustainability and long-term outcomes.

Our study reaffirms that contemporary hysteroscopic practices, both operative and diagnostic, manage to maintain low pain levels across procedures, thereby enhancing patient compliance and satisfaction. However, the distinct challenges faced by menopausal women highlight a gap in current practices, pointing towards the necessity for targeted pain management strategies.

Incorporating findings from pivotal studies [19-25], our discussion extends the understanding of procedural efficacy and patient-centric approaches in hysteroscopy, emphasizing the importance of continual improvement and individualized care in gynecological practices.

CONCLUSION

The results of this comprehensive study offer substantial insights into the comparative experiences of pain between operative and diagnostic hysteroscopy, underlining the effectiveness of current pain management protocols that adequately minimize discomfort across both types of procedures. The significant revelation that menopausal status impacts pain perception invites a focused approach to pain management, particularly for this subgroup, indicating a necessity for bespoke strategies to enhance their procedural experience.

While both operative and diagnostic hysteroscopies have proven to be low in terms of pain levels thanks to advanced analgesic techniques and procedural refinements, the extended duration of operative hysteroscopies did not correlate with increased pain, which affirms the proficiency of existing pain control measures. However, the notable discomfort reported by menopausal women suggests that there are still areas within pain management that require further refinement and personalization. It's apparent that despite overarching improvements, the 'one-size-fits-all' approach may not be applicable in all cases, especially in sensitive or potentially complicated scenarios like those presented by postmenopausal physiology.

Furthermore, this study has shown that standard variables such as parity and previous surgical history,

which could be presumed to influence pain perception, do not markedly alter the pain scores due to the efficiency of current pain mitigation practices. This is a positive reflection on the versatility and adaptability of modern hysteroscopic techniques, which are capable of providing a comfortable experience for most patients regardless of their medical or surgical history.

Ethical statement

Approval was obtained from the University of Health Sciences, İstanbul Bağcılar Health Research Center Clinical Research Ethics Committee with the ethical approval code issued for conducting research involving human participants (Ethics Approval No: 2023/248).

Authors' Contribution

Study Conception: VÖ; Study Design: VÖ, TB; Supervision: TB; Funding: N/A; Materials: VÖ, TB; Data Collection and/or Processing: VÖ, TB; Statistical Analysis and/or Data Interpretation: VÖ, TB; Literature Review: VÖ, TB; Manuscript Preparation: VÖ, TB and Critical Review: TB.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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