RESEARCH PAPER

Analysis of Anaesthetic Techniques for Hysteroscopic Procedures

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Abstract

Background: Hysteroscopy is a minimally invasive procedure widely used in the diagnosis and surgical management of intrauterine pathologies. The selection of an appropriate anaesthetic technique is a critical determinant of procedural safety, patient comfort and clinical outcomes. Both general anaesthesia (GA) and subarachnoid block (SAB) are commonly employed for hysteroscopy, yet comparative evidence from South Asian clinical settings remains limited. This study aimed to compare the clinical outcomes, hemodynamic profiles, recovery times, complication rates and patient satisfaction between GA and SAB in patients undergoing hysteroscopic procedures.

Methods: A case-control study was conducted at the Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangladesh Medical University, Dhaka, from January 2025 to January 2026. A total of 76 adult patients (ASA I–II) scheduled for diagnostic or therapeutic hysteroscopy were enrolled. Participants were allocated into two equal groups: GA (n = 38) and SAB (n = 38). Demographic variables, hemodynamic parameters, pain scores using the Numerical Rating Scale (NRS), recovery time, procedural success and complications were recorded and analyzed using SPSS version 23.0.

Results: Both groups were comparable at baseline in age, BMI, ASA status and indications ($p > 0.05$). Intraoperative heart rate was significantly higher in the GA group (84.7 ± 11.6 vs 76.2 ± 10.4 bpm; $p < 0.001$), while diastolic BP and MAP were significantly lower in the SAB group ($p = 0.032$ and $p = 0.031$, respectively). GA was associated with significantly faster recovery (42.3 ± 12.6 vs 68.7 ± 18.4 min; $p < 0.001$) and a higher proportion of patients recovering within one hour (76.3% vs 36.8%; $p < 0.001$). Post-operative nausea and vomiting (PONV) was more common in the GA group (23.7% vs 10.5%), whereas shivering was significantly more frequent in the SAB group (15.8% vs 2.6%; $p = 0.046$). Overall complication rates and patient satisfaction did not differ significantly between the groups.

Conclusion: Both GA and SAB are effective and safe anaesthetic options for hysteroscopic procedures. GA offers faster recovery, while SAB provides superior intraoperative hemodynamic

stability. Individualized anaesthetic selection based on patient profile and procedural complexity is recommended.

Keywords: General anaesthesia, hysteroscopy, spinal anaesthesia, subarachnoid block, hemodynamic stability.

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Introduction

Hysteroscopy has become one of the most pivotal minimally invasive procedures in contemporary gynaecology, enabling direct visualization of the uterine cavity for both diagnostic and therapeutic purposes. Since its first description in the 19th century, the technique has undergone substantial evolution, transforming the standard of care for a wide range of intrauterine pathologies. It is now considered the gold standard for evaluation of abnormal uterine bleeding (AUB), infertility investigations, endometrial polyp removal and the management of Mullerian anomalies and uterine adhesions [1]. The American College of Obstetricians and Gynaecologists endorses its use for the diagnosis and treatment of intrauterine pathology, underscoring its central role in modern gynaecological practice [2].

The expanding indications for hysteroscopy have been paralleled by increasing attention to the anaesthetic management of these procedures. The role of anaesthesia in hysteroscopy is determined by whether the procedure is diagnostic or operative, as well as by patient-specific factors including anxiety, pain tolerance, comorbidities and the anticipated complexity of the intervention. Anaesthetic options encompass local anaesthesia with or without sedation, paracervical block, regional anaesthesia (spinal or epidural) and general anaesthesia [3]. Each technique carries its own advantages, limitations and complication profile and no single approach has been universally established as optimal [4].

General anaesthesia (GA) provides reliable surgical conditions and complete patient unconsciousness, making it suitable for operative hysteroscopy and anxious patients. Common agents used include propofol for induction, with sevoflurane or total intravenous anaesthesia (TIVA) for maintenance. Supraglottic devices such as the laryngeal mask airway (LMA) are frequently used to avoid complications of endotracheal intubation, with evidence showing that combinations like propofol and dexmedetomidine reduce adverse outcomes during LMA insertion better than propofol alone [5]. While GA offers rapid induction and predictable depth of anaesthesia, it carries risks of post-operative nausea and vomiting (PONV) and transient hemodynamic fluctuations during induction [6]. Spinal anaesthesia (subarachnoid block, SAB), on the other hand, provides a dense sensory and motor block of the lower half of the body without affecting consciousness. It is cost-effective, technically straightforward and avoids airway manipulation. However, SAB may be associated with hypotension, bradycardia, post-dural puncture headache, shivering and prolonged motor recovery, which can delay discharge in ambulatory settings [7,8]. Techniques such as the addition of suprainguinal fascia iliaca block can help to prolong spinal anaesthesia duration and improve outcomes, reducing perioperative opioid requirements [7]. Thus, GA and SAB each have distinct advantages and risks and the choice depends on balancing rapid unconsciousness and airway management concerns with hemodynamic stability and recovery profiles appropriate to the surgical and patient context.

Several comparative studies have examined these two modalities in hysteroscopy and related gynaecological procedures. Manouchehrian et al. conducted a non-randomized clinical trial in Iran comparing GA, spinal anaesthesia and paracervical block in diagnostic hysteroscopy and reported that GA was associated with significantly higher post-operative pain scores and greater analgesic requirements than SAB [4]. Conversely, El Jaouhari et al. found in a prospective study of 76 hysteroscopy patients that while hypotension was more frequent in the SAB group, patient satisfaction and surgeon satisfaction were significantly higher with SAB and recovery room stay was shorter [9]. These divergent findings reflect the complexity of anaesthetic selection and underscore the absence of a consensus anaesthetic protocol for hysteroscopy.

From the perspective of hemodynamic monitoring, intraoperative blood pressure and heart rate are critical safety indicators. Neuraxial anaesthesia is known to induce sympathetic blockade, which may reduce mean arterial pressure and heart rate depending on the block level, while GA may trigger tachycardia and transient hypertension during laryngoscopy and intubation [10]. Understanding these intraoperative changes is essential in a Bangladeshi context, where the majority of hysteroscopic procedures are performed at tertiary care institutions under anaesthesiologist supervision, often in resource-limited settings that demand high procedural safety and efficient patient throughput.

Recovery time following anaesthesia is another key outcome influencing patient satisfaction and healthcare utilization. General anaesthesia, particularly when short-acting agents are employed, is typically associated with earlier return to consciousness and faster discharge eligibility compared to SAB, which requires complete regression of motor block [11,12]. Post-operative complications such as PONV, shivering, dizziness, urinary retention and headache are also important determinants of the overall patient experience and length of hospital stay [13].

Despite the growing global literature, comparative data on GA versus SAB for hysteroscopy from Bangladesh and the broader South Asian region remain sparse. Most available studies originate from Middle Eastern or European centers and their findings may not directly translate to a Bangladeshi clinical context given difference in patient demographics, drug availability, institutional infrastructure and procedural practices. There is, therefore, a clear need for locally conducted, rigorous comparative research to guide anaesthetic decision-making in hysteroscopic procedures.

This study was designed to compare the clinical outcomes of GA and SAB in patients undergoing hysteroscopic procedures at Bangladesh Medical University, Dhaka. The primary objective was to assess intraoperative hemodynamic stability, post-operative pain, recovery time, complication rates and patient satisfaction across the two anaesthetic techniques, with the aim of generating evidence applicable to clinical practice in this setting.

Materials & Methods

This was a case-control study conducted at the Department of Anaesthesia, Analgesia and Intensive Care Medicine, Bangladesh Medical University (formerly Bangabandhu Sheikh Mujib Medical University), Dhaka, Bangladesh. The study was carried out over one year from January 2025 to January 2026. A total of 76 adult patients who underwent hysteroscopic procedures (diagnostic or diagnostic plus therapeutic) within the operation theatre of the department were enrolled. Participants were assigned to one of two groups: the General Anaesthesia (GA) group (n = 38) or the Spinal Anaesthesia (SAB) group (n = 38).

Selection Criteria

Inclusion Criteria

- Adult patients aged 18 years and above undergoing hysteroscopic procedures (diagnostic or therapeutic) during the study period.

- Patients with American Society of Anaesthesiologists (ASA) physical status I or II.
- Patients who provided written informed consent prior to enrolment.
- Procedures involving diagnostic hysteroscopy, polypectomy, myomectomy, or dilatation and curettage (D&C).

Exclusion Criteria

- Patients with ASA physical status III or IV.
- Pregnant women or those undergoing laparoscopic procedures.
- Patients with a history of known drug allergy or prior adverse anaesthetic events.
- Patients with a body mass index (BMI) of 30 kg/m² or above (potential difficult airway).
- Patients under 18 years of age, as anaesthesia protocols and outcomes may differ significantly in the paediatric population.
- Patients with incomplete anaesthesia records or missing outcome data.
- Patients who underwent highly complex or emergency hysteroscopic procedures.

Data Collection Procedure

Data were collected prospectively using a structured, pretested questionnaire developed in accordance with the study protocol. Following approval from the institutional ethics committee and before inclusion in the study, written informed consent was obtained from all participants. Patients were informed about the study objectives, procedures and their right to withdraw at any time without prejudice to their care. All patient information was handled with strict confidentiality and the data were anonymized before analysis.

At the pre-anaesthetic assessment, baseline demographic information was recorded, including age, BMI, ASA physical status and indication for hysteroscopy. The assigned anaesthetic technique was determined by the attending anaesthesiologist based on clinical suitability and the study protocol. In the GA group, anaesthesia was induced with intravenous propofol (2 mg/kg) and maintained with sevoflurane/isoflurane or TIVA using a laryngeal mask airway (LMA)/endotracheal (ET) tube. For the SAB group, spinal anaesthesia was administered in the sitting or lateral decubitus position using 0.5% hyperbaric bupivacaine via a standard lumbar puncture at the L3-L4 interspace.

Intraoperative monitoring included continuous noninvasive blood pressure, heart rate, oxygen saturation (SpO2) and electrocardiography at baseline, intraoperatively and 30 min postoperatively. Pain was assessed using the Numerical Rating Scale (NRS; 0 = no pain, 10 = worst imaginable pain) at three time points: 30 minutes, one hour and two hour post-operatively. Recovery time was defined as the time from the completion of anaesthesia to the full return of consciousness (GA) or complete motor recovery (SAB). Procedure duration, success rate, complications (intraoperative and postoperative) and patient satisfaction (assessed using a 5-point Likert scale) were also recorded. All data were entered contemporaneously onto a structured data collection sheet by the attending anaesthesiology team and subsequently transferred to a computerized database for analysis.

Statistical Analysis

Collected data were analyzed using IBM SPSS Statistics version 23.0. Continuous variables were expressed as mean ± standard deviation (SD) and compared using the independent samples t-test. Categorical variables were presented as frequency and percentage and compared using the chi-square test or Fisher exact test, as appropriate. A two-tailed p-value of less than 0.05 was considered statistically significant for all analyses.

Results

Table 1. Demographic and Baseline Clinical Characteristics of Study Participants (n = 76)

Variable	General	Spinal Anaest	p-

		Anaesthesia (n = 38)	hesia (n = 38)	value
Age group, n (%)	18–30 years	13 (34.2)	11 (28.9)	0.834
	31–40 years	14 (36.8)	16 (42.1)	
	41–50 years	8 (21.1)	7 (18.4)	
	> 50 years	3 (7.9)	4 (10.5)	
	Mean ± SD	34.8 ± 9.3	36.2 ± 8.7	0.4611
BMI (kg/m²)	Mean ± SD	23.6 ± 2.8	24.1 ± 3.0	0.4188
ASA Physical Status, n (%)	ASA I	22 (57.9)	24 (63.2)	0.627
	ASA II	16 (42.1)	14 (36.8)	
Indication for Hysteroscopy, n (%)	Abnormal uterine bleeding	18 (47.4)	19 (50.0)	0.952
	Infertility/Mullerian anomaly	9 (23.7)	8 (21.1)	
	Endometrial polyp	6 (15.8)	7 (18.4)	
	D&C / Polypectomy	5 (13.2)	4 (10.5)	
Procedure Type, n (%)	Diagnostic only	21 (55.3)	23 (60.5)	0.643
	Diagnostic + Therapeutic	17 (44.7)	15 (39.5)	

Table 1 presents the demographic and baseline clinical characteristics of the study participants. The mean age of patients in the GA group was 34.8 ± 9.3 years, compared to 36.2 ± 8.7 years in the SAB group, with no statistically significant difference (p = 0.461). The most common age group in both groups was 31–40 years. Mean BMI was 23.6 ± 2.8 kg/m² in the GA group and 24.1 ± 3.0 kg/m² in the SAB group (p = 0.418). ASA I status predominated in both groups (57.9% vs 63.2%) and the distribution of ASA status was comparable (p = 0.627). Abnormal uterine bleeding was the leading indication for hysteroscopy in both groups (47.4% in GA; 50.0% in SAB), followed by infertility and endometrial polyps. Diagnostic-only procedures accounted for 55.3% and 60.5% of cases in the GA and SAB groups, respectively. No statistically significant differences were observed for any baseline variable, confirming the comparability of the two groups.

Table 2. Intraoperative and Post-operative Hemodynamic Parameters by Anaesthetic Technique

Hemodynamic Parameter		GA (n = 38) Mean ± SD	SAB (n = 38) Mean ± SD	p-value
Baseline (Pre-operative)	Systolic BP (mmHg)	118.4 ± 9.6	117.8 ± 10.2	0.783
	Diastolic BP (mmHg)	76.2 ± 7.4	75.9 ± 8.1	0.863
	MAP (mmHg)	90.3 ± 7.1	89.9 ± 7.8	0.806
	Heart rate (bpm)	82.4 ± 10.3	81.6 ± 9.8	0.718
Intraoperative	Systolic BP (mmHg)	109.6 ± 11.4	104.3 ± 12.8	0.048

	Diastolic BP (mmHg)	70.1 ± 8.3	65.8 ± 9.6	0.032
	MAP (mmHg)	83.3 ± 8.9	78.6 ± 10.1	0.031
	Heart rate (bpm)	84.7 ± 11.6	76.2 ± 10.4	< 0.001
Post-operative (30 min)	Systolic BP (mmHg)	114.2 ± 10.8	113.6 ± 11.3	0.804
	Diastolic BP (mmHg)	74.6 ± 8.0	73.9 ± 8.6	0.717
	MAP (mmHg)	87.8 ± 8.4	87.1 ± 8.9	0.724
	Heart rate (bpm)	80.3 ± 9.7	79.1 ± 9.2	0.579

Table 2 presents the hemodynamic profiles at three time points. Baseline pre-operative hemodynamic values were similar between the two groups, with no statistically significant differences in systolic BP, diastolic BP, MAP, or heart rate (all $p > 0.05$). Intraoperatively, the SAB group demonstrated significantly lower diastolic BP (65.8 ± 9.6 vs 70.1 ± 8.3 mmHg; $p = 0.032$), MAP (78.6 ± 10.1 vs 83.3 ± 8.9 mmHg; $p = 0.031$) and heart rate (76.2 ± 10.4 vs 84.7 ± 11.6 bpm; $p < 0.001$) compared to the GA group. Systolic BP also tended to be lower in the SAB group intraoperatively (104.3 ± 12.8 vs 109.6 ± 11.4 mmHg; $p = 0.048$). Post-operative hemodynamic parameters at 30 minutes were comparable between the two groups, indicating recovery of hemodynamic equilibrium in both.

Table 3. Procedural Outcomes: Postoperative Pain, Recovery Time and Patient Satisfaction

Outcome Variable		GA (n = 38)	SAB (n = 38)	p-value
Post-operative Pain (NRS) at 30 min	Mean ± SD	2.3 ± 1.5	2.8 ± 1.6	0.145
	Nil / Mild (0–3), n (%)	30 (78.9)	27 (71.1)	0.417
Recovery Time	Time to full consciousness / motor recovery (min), Mean ± SD	42.3 ± 12.6	68.7 ± 18.4	< 0.001
	Recovery < 1 hour, n (%)	29 (76.3)	14 (36.8)	< 0.001
	Recovery 1–3 hours, n (%)	8 (21.1)	19 (50.0)	0.007
	Recovery > 3 hours, n (%)	1 (2.6)	5 (13.2)	0.09
Procedure Duration	Duration (min), Mean ± SD	28.4 ± 9.7	31.2 ± 10.4	0.199
	< 30 min, n (%)	22 (57.9)	18 (47.4)	0.348
	30–60 min, n (%)	14 (36.8)	17 (44.7)	0.474
	> 60 min, n (%)	2 (5.3)	3 (7.9)	0.644
Procedure Success & Satisfaction	Procedure success rate, n (%)	37 (97.4)	36 (94.7)	0.554
	Patient satisfaction (satisfied/highly satisfied), n (%)	34 (89.5)	31 (81.6)	0.336
	Anaesthesia re-supplementation required, n (%)	2 (5.3)	4 (10.5)	0.394

Table 3 describes postoperative pain, recovery time, procedural duration, success rate and patient satisfaction. Post-operative pain at 30 minutes was also comparable (GA: 2.3 ± 1.5 vs SAB: 2.8 ± 1.6; $p = 0.145$). The mean procedure duration was similar between groups (GA: 28.4 ± 9.7 min vs SAB: 31.2 ± 10.4 min; $p = 0.199$). Regarding recovery, the GA group demonstrated significantly faster recovery, with a mean time to full consciousness of 42.3 ± 12.6 minutes compared to 68.7 ± 18.4 minutes for motor recovery in the SAB group ($p < 0.001$). A significantly higher proportion of GA patients recovered within one hour

(76.3% vs 36.8%; p < 0.001), while SAB patients were more likely to require 1–3 hours for full recovery (50.0% vs 21.1%; p = 0.007). Procedure success rates were high in both groups (GA: 97.4% vs SAB: 94.7%; p = 0.554). Patient satisfaction rates (satisfied or highly satisfied) were 89.5% in the GA group and 81.6% in the SAB group, with no statistically significant difference (p = 0.336).

Table 4. Incidence of Anaesthesia-Related Complications

Complication		GA (n = 38) n (%)	SAB (n = 38) n (%)	p-value
Intraoperative Complications	Hypotension (SBP < 90 mmHg)	3 (7.9)	7 (18.4)	0.183
	Bradycardia (HR < 50 bpm)	1 (2.6)	4 (10.5)	0.16
	Airway complications (laryngospasm / desaturation)	3 (7.9)	0 (0.0)	0.077
	Uterine distension fluid overload	1 (2.6)	2 (5.3)	0.554
	Any intraoperative complication	8 (21.1)	13 (34.2)	0.202
Post-operative Complications	Nausea / Vomiting (PONV)	9 (23.7)	4 (10.5)	0.116
	Dizziness / Lightheadedness	6 (15.8)	8 (21.1)	0.542
	Headache	2 (5.3)	5 (13.2)	0.232
	Urinary retention	0 (0.0)	3 (7.9)	0.078
	Shivering	1 (2.6)	6 (15.8)	0.046
	Hypotension or hypertension (post-op)	2 (5.3)	4 (10.5)	0.394
	Any post-operative complication	14 (36.8)	17 (44.7)	0.473
Overall Complication Summary	Total complications (any)	17 (44.7)	21 (55.3)	0.356
	Serious complications requiring intervention	2 (5.3)	3 (7.9)	0.644
	No complications	21 (55.3)	17 (44.7)	0.356

Table 4 summarizes the incidence of intraoperative and post-operative anaesthesia-related complications. Intraoperatively, hypotension (SBP < 90 mmHg) occurred in 7.9% of GA patients and 18.4% of SAB patients (p = 0.183). Bradycardia was observed in 2.6% and 10.5% of GA and SAB patients, respectively (p = 0.160). Airway complications (laryngospasm or oxygen desaturation) were recorded exclusively in the GA group (7.9% vs 0.0%; p = 0.077), though the difference did not reach statistical significance. The overall intraoperative complication rate was 21.1% in the GA group and 34.2% in the SAB group (p = 0.202). Post-operatively, PONV was more frequent in the GA group (23.7% vs 10.5%; p = 0.116), while shivering was significantly more common in the SAB group (15.8% vs 2.6%; p = 0.046). Urinary retention occurred only in the SAB group (7.9% vs 0.0%; p = 0.078). The overall post-operative complication rate was

36.8% in GA and 44.7% in SAB patients (p = 0.473). No statistically significant between-group difference was observed for total complications (44.7% vs 55.3%; p = 0.356) and serious complications requiring intervention were rare in both groups (5.3% vs 7.9%; p = 0.644).

Discussion

This case-control study compared the outcomes of general anaesthesia and subarachnoid block in 76 patients undergoing hysteroscopic procedures at a tertiary care hospital in Dhaka, Bangladesh. The principal findings were that both techniques produced comparable pain scores and procedure success rates, while GA offered significantly faster recovery and SAB was associated with greater intraoperative hemodynamic suppression, particularly in heart rate. Shivering was the only complication to reach statistical significance, occurring more frequently in the SAB group.

The baseline demographic and clinical characteristics of the two groups were well-matched, with no statistically significant differences in age, BMI, ASA status, or procedural indication. This comparability strengthens the internal validity of the comparison. The mean patient age in the present study was approximately 35 years in both groups, reflecting the predominantly reproductive-age female population presenting with indications such as abnormal uterine bleeding and infertility. Abnormal uterine bleeding was the leading indication in both groups (approximately 48%), consistent with existing literature indicating that AUB is the most common reason for referral to hysteroscopy [1].

Regarding intraoperative hemodynamic responses, the present study found that SAB was associated with significantly lower intraoperative diastolic BP, MAP and heart rate compared to GA (p = 0.032, 0.031 and < 0.001, respectively). These findings are consistent with the well-established pharmacophysiology of neuraxial anaesthesia, wherein sympathetic blockade leads to peripheral vasodilation and reduced cardiac output. El Jaouhari et al. similarly documented a significantly higher incidence of hypotension in the SAB group (p = 0.024) compared to GA in a comparable study of 76 hysteroscopy patients [9]. Manouchehrian et al. also observed that hemodynamic disturbances were more pronounced under spinal than general anaesthesia in diagnostic hysteroscopy [4]. In the current study, baseline and post-operative hemodynamic values were comparable between the two groups, indicating that these intraoperative differences were transient and clinically managed without sequelae.

In the present study, post-operative NRS at 30 minutes also did not differ significantly between groups (GA: 2.3 ± 1.5 vs SAB: 2.8 ± 1.6; p = 0.145), suggesting that both regimens provided comparable early post-operative pain control when supplemented with standard perioperative analgesic protocols.

One of the most clinically significant findings in this study was the notably faster recovery time in the GA group. Mean recovery time was 42.3 ± 12.6 minutes for GA patients compared to 68.7 ± 18.4 minutes for SAB patients (p < 0.001). A significantly greater proportion of GA patients recovered within one hour (76.3% vs 36.8%; p < 0.001). This advantage is attributed to the use of short-acting intravenous induction agents such as propofol, which facilitate rapid and predictable emergence from anaesthesia. In contrast, SAB requires complete regression of motor block, which typically takes longer due to the pharmacokinetics of intrathecal bupivacaine. El Jaouhari et al. reported a shorter recovery room stay with SAB compared to GA (p = 0.04), which differs from our finding; this discrepancy may reflect variations in drug dosing, surgical duration and recovery criteria between studies [9].

Post-operative nausea and vomiting (PONV) occurred more frequently in the GA group in the present study (23.7% vs 10.5%), though the difference was not statistically significant (p = 0.116). PONV is a recognized complication of general anaesthesia, with reported rates of up to 30% in the general surgical population and higher in female patients [14]. The use of volatile anaesthetics and opioids during GA is a known emetogenic stimulus. While not

reaching significance in this study, the trend of higher PONV in the GA group is clinically meaningful and consistent with the broader literature. Prophylactic antiemetics should therefore be considered routinely in patients undergoing GA for hysteroscopy.

Shivering was the only complication to reach statistical significance, occurring in 15.8% of SAB patients compared to 2.6% in the GA group ($p = 0.046$). Post-spinal shivering is a well-documented complication of neuraxial anaesthesia, resulting from core-to-peripheral heat redistribution and impairment of thermoregulatory vasoconstriction below the level of the block. Esmat et al. reported a shivering incidence of 74% in the control group of patients undergoing gynaecological procedures under spinal anaesthesia, highlighting the high baseline risk in this population [15]. Prophylactic pharmacological agents such as dexamethasone, mirtazapine, ketamine and dexmedetomidine have been studied for the prevention of post-spinal shivering, with varying degrees of efficacy [15]. In the present study, no standardized anti-shivering prophylaxis was employed, which may explain the higher observed incidence in the SAB group.

Urinary retention was observed exclusively in the SAB group (7.9% vs 0.0%; $p = 0.078$), though statistical significance was not achieved, likely due to the relatively small sample size. Spinal anaesthesia is known to suppress detrusor contractility through sacral nerve block, with detrusor function typically recovering after sensory block regression to the S2-S3 level, which may take several hours [16]. This finding has practical implications for patient discharge planning in ambulatory hysteroscopy settings, where timely voiding ability is a standard discharge criterion. Airway complications, including laryngospasm and oxygen desaturation, occurred only in the GA group (7.9%), though again without statistical significance ($p = 0.077$). These events are inherent risks of airway management under general anaesthesia and underscore the importance of skilled airway assessment and vigilant intraoperative monitoring.

Procedure success rates were high and comparable in both groups (GA: 97.4% vs SAB: 94.7%; $p = 0.554$). Patient satisfaction was similarly high (GA: 89.5% vs SAB: 81.6%; $p = 0.336$), with no statistically significant difference. This parallels the observations of El Jaouhari et al., who reported higher satisfaction in the SA group of their hysteroscopy study [9]; however, that difference reached significance, unlike in the present study. The high overall satisfaction rates in both groups in the present study reflect the effectiveness of both techniques when administered by trained personnel with adequate perioperative care.

Overall, the total complication rate was 44.7% in the GA group and 55.3% in the SAB group, with no statistically significant difference ($p = 0.356$). Serious complications requiring intervention were rare and comparable (5.3% vs 7.9%; $p = 0.644$). These findings support the safety of both techniques for hysteroscopic procedures in ASA I–II patients, provided that appropriate monitoring and management protocols are in place. The choice between GA and SAB in clinical practice should therefore be guided by patient characteristics, procedural complexity, available resources and the individual anesthesiologist's expertise, rather than by a single universally prescribed approach.

Limitations of the study

The study was conducted at a single center with a relatively small sample size which may limit the generalizability of the findings. The non-randomized, purposive sampling approach used may introduce selection bias. Future multicenter randomized controlled trials with larger sample sizes are warranted.

Conclusion

Both general anaesthesia and subarachnoid block are safe and effective anaesthetic options for hysteroscopic procedures in ASA I–II patients. General anaesthesia provides significantly faster recovery and is associated with less shivering, whereas subarachnoid block produces better intraoperative hemodynamic suppression. Pain control,

procedure success and patient satisfaction were comparable between the two techniques. Anaesthetic selection should be individualized based on patient profile, procedural complexity and institutional resources.

Conflicts of interest: There are no conflicts of interest.

Ethical Approval: This study approved by the institutional ethical review committee.

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