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Retrospective analysis of anaesthetic techniques for hysteroscopic procedures at a tertiary care centre

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Abstract

Background: The selection of anesthesia in hysteroscopy is influenced by the procedure's objective, whether diagnostic or therapeutic. The chosen anesthesia should reduce risks, enhance patient comfort, and create favorable conditions for the procedure. A variety of anesthesia techniques are utilized, such as local infiltration, paracervical block, regional anesthesia, and general anesthesia, each presenting distinct benefits and drawbacks.

Methods and Results: This retrospective analysis sought to assess anesthesia preferences and their outcomes in hysteroscopic procedures performed at Bhakti Vedanta Hospital and Research Institute between January 2020 and December 2022. Data from 160 patients were reviewed, emphasizing demographic details, existing health conditions, types of anesthesia, and their correlation with surgical time and complications. General anesthesia (GA) and spinal anesthesia (SA) were the primary methods, with GA further divided into subcategories: General anesthesia using endotracheal tube (GA-ETT), General anesthesia using laryngeal mask airway (GA-LMA), General anesthesia using total intravenous anaesthesia (GA-TIVA). The study found a significant relationship between the type of anesthesia administered and the presence of patient comorbidities, as well as the length of therapeutic surgeries.

Conclusion: Although a universally optimal anesthesia method for hysteroscopy has not yet been identified, both GA and SA have proven to be dependable and effective for diagnostic and therapeutic applications. This study emphasizes the necessity for additional research to identify the most appropriate anesthesia technique, prioritizing patient comfort, safety, and procedural outcomes.

Keywords: General anesthesia, hysteroscopy, endotracheal tube (ETT), laryngeal mask airway (LMA), total intravenous anaesthesia (TIVA), spinal anaesthesia (SA)

Introduction

The role of anaesthesia in hysteroscopy depends on whether hysteroscopy is employed for diagnostic or surgical purposes. The optimal anesthesia approach should reduce complications, ensure patient comfort, and establish the best possible conditions for the procedure. The choices for hysteroscopic anesthesia include local anesthesia infiltration, with or without sedation, paracervical block, with or without sedation, regional anesthesia like spinal, epidural, or combined spinal-epidural anesthesia, and general anesthesia^[1].

Hysteroscopy was initially conducted on a patient in 1869 by Pantaleoni, who, utilizing a cystoscope created by Desormeaux, identified and treated an endometrial polyp in a 60-year-old patient with postmenopausal bleeding^[2]. It has been shown that hysteroscopy is a minimally invasive technique and effective for the removal of retained products of conception and foreign bodies with low complication rates, the care team must be aware and ready to address any potential hazards^[3].

Recently, this procedure is becoming increasingly used as an in-office technique for diagnosing and treating certain intrauterine pathologies. However, a study conducted in mainland China state that more than 60% hysteroscopic procedures were done under sedation by an anaesthesiologist^[4]. However, the rare but potentially severe nature of these complications makes it crucial for everyone involved in the surgery to stay alert. Therefore, the anaesthesiologist must be aware of the potential hazards associated with the procedures^[5]. Evidence shows that each method of anaesthesia has its advantages and disadvantages, so to date no ideal anaesthesia method has been proposed for hysteroscopy surgery and there is a need for further study in this^[6,7].

Additional studies are required to identify which methods offer the greatest comfort to the patient and reduce the risk of complications, particularly during operative hysteroscopy. Therefore, our retrospective single-centre study analysed the type of anaesthesia for hysteroscopic procedures along with the duration of surgery and a review of complications.

Materials and Methods

This is a retrospective study of patients who underwent hysteroscopy between January 2020 and December 2022. The data was obtained from the operation theatre registers containing demographic details, surgical specifics, and anaesthesia particulars for eligible patients at Bhakti Vedanta Hospital and Research Institute. The records encompassed individuals aged 18 with American Society of Anesthesiologists physical status as ASA I and ASA II, having undergone hysteroscopic procedures for either diagnostic purposes or diagnostic plus therapeutic interventions such as polypectomy, myomectomy, and dilation and curettage (D&C) within the operation theatre. An informed consent was obtained before the start of the procedure. Pregnant females and patients undergoing laparoscopic procedures, upper airway or gastrointestinal problems who are at a higher risk of aspiration, or either had a history of drug allergy, pre-existing renal or hepatic dysfunction, pre-existing cardiovascular disease, or BMI ≥

30 kg/m² (difficult airway) and Patients with ASA grade III and IV were excluded from the study. Consequently, a total of 160 case records meeting the inclusion criteria underwent review. Approval for the conduct of this study was provided by the Institutional Ethics Committee.

Statistical Analysis

Clinical, preoperative diagnostics, and procedure characteristics were summarized using standard descriptive statistics. Comparisons between the two groups were performed as appropriate: categorical variables were compared with the chi-square test or Fisher exact test; Analyses were performed with IBM SPSS Statistics 23.0 and tests of statistical significance were conducted with a two-tailed alpha level of 0.05.

Results

During the study period, according to the demographic records, the patient pool ranged from 21 to 71 years of age. The distribution of patients was as follows: 23 patients between 21 and 30 years of age (combining both diagnostic and therapeutic), 55 patients between 31 and 40 years, 32 patients between 41 and 50 years, 26 patients between 51 and 60 years, and 24 patients above 61 years (Table 1). The major distribution of patients (i.e. 34.73%) was seen between 31 and 40 years of age.

Table 1: Demographic parameters of the enrolled subjects

Age	Diagnostic		Diagnostic & Therapeutic		Total N(N%)
	General Anaesthesia n(n%)	Spinal Anaesthetan (N%)	General Anaesthetan (N%)	Spinal Anaesthetan (N%)	
Below 31 years	4(17.39%)	2(8.69%)	14 (60.86%)	3(13.04%)	23(100%)
31-40 years	14(25.45%)	9(16.36%)	29(52.72%)	3(5.45%)	55(100%)
41-50 years	9(28.12%)	5(15.62%)	12(37.5%)	6(18.75%)	32(100%)
51-60 years	11(42.30%)	13(50%)	1(1.78%)	1(1.78%)	26(100%)
Above 61	17(70.83%)	2(8.33%)	3(12.5%)	2(8.33%)	24(100%)
Total	160				

Based on the type and procedure GA was further classified as general anaesthesia using endotracheal tube (GA-ETT) was grouped as GA I, general anaesthesia using laryngeal mask airway (GA-LMA) as GA II, and general anaesthesia

with total intravenous anaesthesia (TIVA) as GA III (Figure 1). It was seen that in the diagnostic hysteroscopy around 31 patients were given spinal anaesthesia and 25 patients were given GA under laryngeal mask airway LMA.

Table 2: Factors affecting the choice of anaesthesia and its relatedness

Table 2.1: Association between administration of anaesthesia based on the comorbidities in study group

Administration of GA or SA	Comorbidity: Yes n(n%)	Comorbidity: No n(n%)	Total n(n%)
GA I	10 (32.25%)	21(67.74%)	31(100%)
GA II	15(33.33%)	30(66.66%)	45(100%)
GA III	15(39.47%)	23(60.52%)	38(100%)
SA	28(60.86%)	18(39.13%)	46(100%)
Total	68	92	160
Chi-square = 9.37, p = 0.02			

Table 2.2: Association between administration anaesthesia based on the ASA grade in study group

Administration of GA or SA	ASA I n(n%)	ASA II n(n%)	Total n(n%)
GA I	23(74.19%)	8(25.80%)	31(100%)
GA II	31(68.88%)	14(31.11%)	45(100%)
GA III	26(68.42%)	12(31.57%)	38(100%)
SA	19(41.30)	27(58.69%)	46(100%)
Total	99	61	160
Chi-square = 11.87, p = 0.008			

In the above (Table 2.2), approximately 68 patients (42.5%) had comorbid conditions, the most common comorbidities were diabetes and hypertension, which accounted for around 37 subjects. Other comorbidities included asthma, hypothyroidism and hyperthyroidism respectively seen in about 31 subjects. During the statistical analysis a

significant association was between administration of general anaesthesia/spinal anaesthesia and comorbidities seen in the enrolled subjects. According to American Society of Anaesthesiologists (ASA), the patients were grouped as ASA-I and another grouped as combined ASA-II (Table 2.2). A statistically significant result was associated.

Table 3a: Comparison of duration of surgery with administration of GA or SA in Diagnostic group

Administration of GA or SA	Duration of surgery (min)			P-Value
	No. of patients(n)	Mean	SD	
GA I	10	54.00	22.45	0.16
GA II	20	45.15	12.99	
GA III	25	41.60	11.33	
SA	31	44.67	14.60	

Table 3b: Comparison of duration of surgery with administration of GA or SA in Diagnostic & Therapeutic group

Administration of GA or SA	Duration of surgery (min)			P-Value
	No. of patients (n)	Mean	SD	
GA I	21	64.52	38.98	0.009
GA II	25	47.60	18.54	
GA III	13	35.00	9.78	
SA	15	51.33	11.25	

During the study period, extracted data (diagnostic group) compared the duration of surgery with the administration of GA or SA. And it was seen that around 31 patients were administered SA and only 10 patients were in the category of GA I. However, statistically non-significant results were seen between the duration of procedure and anaesthesia in the diagnostic group. (Table 3a).

Data analysis was done in the therapeutic group, where duration of surgery with administration of GA or SA and a statistically significant data has been found (Table 3b). It was found that most of the patient were administered GA using LMA.

Discussion

The study should be elaborately discussed with the significance of the results with the help of earlier work and reports. Hysteroscopy with anaesthesia is the prevailing method though occasionally conducted without anaesthesia in an office setting for diagnostic purposes. This study meticulously observed all procedures that took place within the confines of the operation theatre, requiring careful patient monitoring. Extensive preparation, like that of any surgical procedure, was carried out, including thorough historical examination, physical assessment, and comprehensive laboratory tests such as serum electrolyte and haemoglobin level assessments. Special attention was given to limb positioning, meticulously padded to prevent neuropathies, particularly lateral popliteal and brachial plexus neuropathy. The categories of anaesthetic modalities in general includes a) General Anaesthesia b) Spinal Anaesthesia.

GA using ETT

Method

For patients underwent GA using the Endotracheal Tube (ETT). Patients were kept in supine position and preoxygenated well. Patients were monitored for vital signs such as blood pressure, heart rate, SpO₂ and ECG before and during hysteroscopy. Patients were pre-anesthetized with IV Inj. Fentanyl 100mcg and Inj. Midazolam 1mg. Inj. Propofol and Inj. Atracurium was given. Direct

Laryngoscopy was performed. No. 7 Disposable Endotracheal tube was inserted & cuff balloon was inflated, followed by fixation of endotracheal tube. Bilateral air entry was checked and confirmed equal in both lungs. Lithotomy position was given. Hysteroscopy was performed. After hysteroscopy was done, Patients were reversed with IV inj. Neostigmine and inj. Glycopyrrolate. In this study around 31 patients were intubated, among them majority fell into the long duration therapeutic procedures (Table 1,2a,3b). Though it was a gold standard technique, its usage has reduced over the last few years due to technique sensitivity and post operative complication like coughing, sore throat and bleeding in our study 5 patients experienced cough and sore throat compared to other techniques^[8,9].

GA using LMA

LMAs (Laryngeal Mask Airways), also known as SADs (Supraglottic Airway devices), have revolutionized General Anaesthesia. Newer second generation LMA like I-Gel has truly revolutionized the practice of General Anaesthesia. In this method, Patients were kept in supine position & preoxygenated well. IV inj. Fentanyl, inj. Midazolam, inj. Propofol given. LMA was introduced & patient was kept on spontaneous ventilation under nitrous oxide, oxygen, and sevoflurane. Igel size 3 or LMA supreme size 3, were commonly used in this study. After confirming proper poisoning of LMA, lithotomy position was given. Hysteroscopy procedure was performed. At end of the procedure, LMA was removed. Patients were monitored for vital signs such as blood pressure, heart rate, SpO₂ and ECG before and during the procedure.

The LMA ventilation methodology has an advantage over ETT, as it avoids direct laryngoscopy. Hence, avoiding the deleterious stimulation on the tongue root and epiglottis valley when the glottis is exposed directly to laryngoscope contact. Being free of tongue root stimulation is thought to reduce the cardiovascular response caused by tracheal intubation [10]. As Helmy *et al.*,^[11] Reza Hashemian *et al.*,^[12] and Chauhan *et al.*^[13] observed significantly lower insertion times with i-gel™. Because the i-gel™ doesn't require cuff inflation, the time to establish an effective

airway was shorter, and since it doesn't need an introducer, the device can be simply pushed into place [14, 15]. In this study LMA technique was more commonly used when GA was considered. However, the application of a laryngeal mask is contraindicated in obese individuals or those with a history of hiatus hernia with reflux; our study cohort exhibited a BMI within 30.

GA using TIVA

Total intravenous anaesthesia (TIVA) is a modality where general anaesthesia is given and maintained without using ETT & LMA. The patients were induced in supine position. General Anaesthesia was given with IV inj. Fentanyl, inj. Midazolam & inj. Propofol. Patients were kept on spontaneous breathing and given supplemental oxygen using Hudson oxygen mask at 2-5l/min. Whenever required, Oral airway size 2 or 3 was inserted to maintain airway patency. Lithotomy position was given. Hysteroscopy was performed. During the procedure, adequate depth of general anaesthesia was maintained using titrated doses of inj. Propofol. Patients were monitored for vital signs such as blood pressure, heart rate, SpO2 and ECG during the procedure. All The study by Nevesa *et al.* [16] showed that the combination of midazolam, fentanyl, and propofol, reduces propofol consumption and provides greater patient satisfaction. Bahrami Gorji F *et al.* [17] in 2016 concluded that in patients when given a combination of propofol-fentanyl had a less post-operative pain compared to propofol-ketamine, though both had equal sedative effect. Diagnostic Hysteroscopic procedures been of shorter duration, TIVA was used *viz* 25 patients in this study, unlike the longer duration surgeries the therapeutic (Table 3a and 3b). This study included patients who had respiratory condition like asthma, where TIVA modality was contraindicated.

However, a study conducted recently by Mishra *et al.* [18] in 2023 stated that adjuvant like magnesium sulphate MgSO4 when used as an adjuvant fentanyl was more helpful in lowering postoperative pain and the need for rescue analgesics in patients having hysteroscopy.

SA

Spinal Anaesthesia (SA) is an established regional anaesthesia technique for doing Hysteroscopy procedure. SA was performed with a 25/26-gauge Quincke spinal needle or 27 Whitacre spinal needle, in a sitting position at L3-L4 or L4-L5 space under aseptic precautions and 2.5 ml of bupivacaine 0.5% was injected into the subarachnoid space. Positive aspiration of clear cerebrospinal fluid before and after the injection confirmed correct needle placement. Then, the patient was placed in supine position and when the level of anaesthesia reaches T10 area, lithotomy position was given. Hysteroscopy was performed. It is apparent that each method of anaesthesia has its own carried advantage and disadvantage over the other. Yet, until today no ideal anaesthesia method has been proposed for hysteroscopic surgery and therefore further exploration is needed in this area [19, 20]. It was seen that the type of anaesthesia didn't affect the discharge time of the patients, as all patients were monitored and not much complications were seen. In this study there was positive correlation among the prime indicators like ASA, comorbidities and duration of surgery in comparison with the choice of anaesthesia.

Complications

According to Mettler L *et al.* study, [21] 726 hysteroscopies found a complication rate of 1.65% in which false passage and perforation of uterine cavity were reported. Encouragingly, the study recorded no major complications or patient discomfort. Even though many studies have been conducted regarding the safest and most cost-effectiveness method of pain reduction in diagnostic hysteroscopy [22]. This study concludes that both GA and SA can be administered safely for both diagnostic and operative procedures as per the case.

Limitation

This being a single-centre study; therefore, the generalizability of the findings is limited.

Conclusion

The study endeavoured to the current trend of anaesthesia modalities in India. The choice depends on the type of procedure, its duration, its complexity, the patient's terrain and the conventional or outpatient manner of hospitalization.

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Ethical approval

Ethical clearance has been obtained from the Institutional Ethics Committee. The participant's identity was kept strictly confidential, and the privacy of the data was maintained.

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