Section: Anaesthesia

Original Research Article

A COMPARATIVE STUDY OF PROPOFOL VS. SEVOFLURANE FOR MAINTENANCE OF ANESTHESIA IN PEDIATRIC PATIENTS UNDERGOING SHORT SURGICAL PROCEDURES

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Received *: 10/11/2024*
Received in revised form *: 21/12/2024*
Accepted *: 06/01/2025*

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DOI: 10.70034/ijmedph.2025.1.22

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (1); 128-134

ABSTRACT

Background: Aim: This study aimed to compare the effectiveness and safety of Propofol and Sevoflurane for the maintenance of anesthesia in pediatric patients undergoing short surgical procedures. The focus was on evaluating hemodynamic stability, recovery characteristics, postoperative agitation, and adverse events.

Material and Methods: This prospective, randomized, controlled study included 100 pediatric patients aged 2–12 years, classified as ASA physical status I and II, and scheduled for elective short surgical procedures. Patients were randomly assigned to two groups: Group P (Propofol, n=50) and Group S (Sevoflurane, n=50). Group P received a Propofol infusion (6–12 mg/kg/hr IV), while Group S received Sevoflurane (1.5–2.5% inhalation) for anesthesia maintenance. Hemodynamic parameters, recovery times, postoperative agitation (PAED score), and adverse events were assessed.

Results: Both groups were comparable in demographic and baseline characteristics ($p>0.05$). Hemodynamic parameters, including heart rate and mean arterial pressure (MAP), were significantly more stable in Group S ($p<0.05$). Recovery times, including time to eye opening (6.2 ± 1.8 min vs. 8.5 ± 2.1 min, $p<0.001$) and time to extubation (7.3 ± 1.9 min vs. 10.8 ± 2.5 min, $p<0.001$), were shorter in Group S. Postoperative agitation (PAED score: 4.2 ± 0.9 vs. 5.8 ± 1.2, $p=0.003$) and pain scores (VAS: 2.0 ± 0.8 vs. 2.8 ± 1.0, $p=0.017$) were lower in Group S. Adverse events were slightly higher in Group P but were not statistically significant.

Conclusion: Sevoflurane demonstrated superior hemodynamic stability, faster recovery, lower postoperative agitation, and higher parental satisfaction compared to Propofol in pediatric short surgical procedures. Both agents showed a favorable safety profile, but Sevoflurane emerged as a preferred anesthetic choice for short pediatric surgeries.

Keywords: Pediatric Anesthesia, Propofol, Sevoflurane, Hemodynamic Stability, Postoperative Recovery.

INTRODUCTION

Pediatric anesthesia poses unique challenges for anesthesiologists due to the physiological, anatomical, and psychological differences between children and adults. Ensuring optimal anesthetic depth, maintaining hemodynamic stability, minimizing postoperative complications, and facilitating a smooth and rapid recovery are key priorities in pediatric anesthesia. As medical advancements continue to enhance perioperative care, the choice of an appropriate anesthetic agent remains a critical determinant of surgical outcomes, especially in children undergoing short surgical procedures.[1]

Among the wide array of anesthetic agents available, Propofol and Sevoflurane have emerged as two of the most commonly used agents for the maintenance of anesthesia in pediatric patients. Both agents have distinct pharmacokinetic and pharmacodynamic properties, which influence their suitability for various surgical scenarios. Propofol, an intravenous anesthetic, is known for its rapid onset and short duration of action. It provides smooth induction and maintenance of anesthesia, along with rapid and predictable recovery. Propofol has gained popularity because of its antiemetic properties, low incidence of postoperative nausea and vomiting, and minimal residual sedation. However, Propofol is not without its drawbacks, as it can cause significant hemodynamic instability, including hypotension and bradycardia, particularly in children with limited physiological reserves.[2]

On the other hand, Sevoflurane, an inhalational anesthetic, has become the preferred agent for pediatric anesthesia induction and maintenance due to its non-pungent odor, rapid onset, and low blood-gas solubility coefficient. These properties make Sevoflurane an ideal choice for inhalational induction, especially in uncooperative pediatric patients. It offers excellent control over anesthetic depth, and its administration can be titrated effectively to achieve hemodynamic stability during maintenance. Additionally, Sevoflurane facilitates smooth and rapid emergence from anesthesia, which is particularly advantageous in short surgical procedures. However, it has been associated with certain adverse effects, such as emergence agitation, postoperative nausea and vomiting, and rare cases of malignant hyperthermia.[3]

The choice between Propofol and Sevoflurane often depends on several factors, including the nature and duration of the surgical procedure, patient-specific characteristics, and the preferences of the anesthesiologist. While Propofol offers precise control during maintenance of anesthesia and antiemetic effects, Sevoflurane excels in providing a less invasive induction and better hemodynamic stability in certain pediatric populations. Despite the widespread use of both agents, there remains an ongoing debate regarding their comparative effectiveness and safety profiles in the context of short surgical procedures in pediatric patients.[4]

Short surgical procedures, typically lasting less than an hour, are common in pediatric practice and include surgeries such as hernia repairs, tonsillectomies, adenoidectomies, and minor urological and orthopedic interventions. These procedures demand an anesthetic approach that allows for quick induction, stable intraoperative hemodynamics, and rapid emergence with minimal residual sedation or side effects. The need for early recovery and discharge is also a critical consideration, especially in outpatient or day-care surgical settings. Both Propofol and Sevoflurane offer unique advantages in this regard, but they also present distinct challenges that must be carefully evaluated.[5]

Another important consideration in pediatric anesthesia is the prevention of adverse events, such as bradycardia, hypotension, respiratory depression, nausea, vomiting, and postoperative agitation. These complications can not only prolong recovery but also cause significant distress for both patients and their caregivers. Therefore, an ideal anesthetic for pediatric short surgeries should minimize these adverse effects while ensuring effective analgesia and hemodynamic stability throughout the perioperative period.[6,7]

Previous studies have attempted to compare Propofol and Sevoflurane in terms of their hemodynamic effects, recovery profiles, and postoperative outcomes. However, the results remain inconclusive, with some studies favoring Propofol for its antiemetic effects and smooth recovery, while others advocate for Sevoflurane due to its superior hemodynamic stability and ease of administration. The variability in study designs, sample sizes, surgical procedures, and patient characteristics further complicates the comparison.[8]

Both Propofol and Sevoflurane have established themselves as reliable anesthetic agents for pediatric patients. However, their comparative advantages and disadvantages in the context of short surgical procedures warrant further investigation. This study endeavors to fill this knowledge gap by systematically evaluating the intraoperative and postoperative outcomes associated with these two agents, ultimately enhancing the quality of pediatric anesthetic care and improving surgical outcomes.

MATERIALS AND METHODS

This prospective, randomized, controlled study was conducted in the Department of Anesthesiology at tertiary care hospital. The study aimed to compare the effectiveness and safety of Propofol and Sevoflurane in maintaining anesthesia in pediatric patients undergoing short surgical procedures. Ethical clearance was obtained from the Institutional Ethics Committee, and written informed consent was secured from the parents or legal guardians of all participants. A total of 100 pediatric patients, aged 2 to 12 years, who were classified as ASA physical status I and II and scheduled for elective short surgical procedures, were enrolled in the study. The sample size was determined based on a statistical power analysis to ensure valid and reliable results.

Inclusion Criteria

- Pediatric patients aged 2–12 years.
- ASA (American Society of Anesthesiologists) physical status I and II.
- Scheduled for elective short surgical procedures (e.g., hernia repair, tonsillectomy, circumcision).

- Duration of surgery expected to be less than 60 minutes.

Exclusion Criteria

- History of allergy or hypersensitivity to Propofol or Sevoflurane.
- Severe systemic illness (e.g., cardiac, respiratory, hepatic, or renal disease).
- History of malignant hyperthermia or family history of malignant hyperthermia.
- Patients on sedative or hypnotic medications before surgery.

Methodology

Patients were randomly assigned into two groups of 50 each using a computer-generated random number table. Allocation concealment was ensured using sealed opaque envelopes, which were opened only at the time of induction. Group P received Propofol for maintenance of anesthesia, while Group S received Sevoflurane. This randomization process minimized selection bias and ensured equal representation in both groups.

All patients underwent a thorough preoperative assessment, including a detailed medical history, physical examination, and baseline vital parameters such as heart rate, blood pressure, and oxygen saturation. Premedication with Midazolam (0.05 mg/kg) was administered orally or intravenously 30 minutes before induction.

Induction of anesthesia was standardized across both groups, utilizing Propofol (2–3 mg/kg IV) and Fentanyl (1 µg/kg IV). Airway management was performed using either an appropriately sized endotracheal tube or a laryngeal mask airway (LMA) based on the anesthesiologist's discretion.

For maintenance of anesthesia, Group P received a continuous Propofol infusion at a rate of 6–12 mg/kg/hr intravenously, while Group S was administered Sevoflurane inhalation at a concentration of 1.5–2.5% in a 50:50 oxygen-air mixture. Fentanyl boluses (0.5 µg/kg) were administered as needed in both groups to ensure adequate analgesia.

At the end of the surgical procedure, both Propofol infusion and Sevoflurane inhalation were discontinued. Neuromuscular blockade was reversed using Neostigmine (0.05 mg/kg) and Glycopyrrolate (0.01 mg/kg). Patients were monitored until spontaneous eye opening, response to verbal commands, and safe extubation were achieved.

Continuous monitoring was performed throughout the procedure to ensure patient safety and optimal anesthetic depth. Vital signs, including non-invasive blood pressure (NIBP), heart rate, oxygen saturation (SpO_2), and end-tidal carbon dioxide ($EtCO_2$), were closely observed. The depth of anesthesia was assessed using Bispectral Index (BIS) monitoring, ensuring appropriate sedation levels. Any hemodynamic instability or adverse events were promptly addressed by the attending anesthesiologist.

Following the completion of surgery and discontinuation of anesthetics, time to spontaneous eye opening, extubation, and response to verbal commands was recorded. The quality of emergence from anesthesia was evaluated using the Modified Aldrete Score, and postoperative agitation was assessed using the Pediatric Anesthesia Emergence Delirium (PAED) Scale. Postoperative monitoring continued in the recovery room until the patients achieved a stable Modified Aldrete Score.

The primary outcomes measured were hemodynamic stability during maintenance and emergence, as well as the time taken for spontaneous eye opening, extubation, and verbal response. Secondary outcomes included the incidence of adverse events such as bradycardia, hypotension, postoperative nausea, vomiting, and agitation. Additionally, overall recovery quality and patient comfort were evaluated using validated scoring systems.

Statistical Analysis

Data collected were entered into a structured database and analyzed using SPSS software 25.0 version. Continuous variables, such as heart rate, blood pressure, and emergence time, were compared between the two groups using an unpaired t-test. Categorical variables, such as the incidence of adverse events, were analyzed using the chi-square test or Fisher's exact test where appropriate. A p-value of less than 0.05 was considered statistically significant. Results were presented as means with standard deviations or frequencies with percentages, as applicable.

RESULTS

The demographic and baseline characteristics of the study population are presented in Table 1. Both groups, Group P (Propofol) and Group S (Sevoflurane), were comparable in terms of age, weight, height, gender distribution, and ASA physical status classification. The mean age of patients in Group P was 6.5 ± 2.3 years, while in Group S, it was 6.8 ± 2.1 years (p=0.612). Similarly, the average weight was 20.3 ± 4.5 kg in Group P and 21.1 ± 4.2 kg in Group S (p=0.421). Height measurements also showed no significant difference, with 115.4 ± 6.8 cm in Group P and 117.1 ± 7.2 cm in Group S (p=0.356). The gender distribution between the groups was balanced (28 males and 22 females in Group P, 30 males and 20 females in Group S, p=0.716). Additionally, the ASA physical status classification was similar across both groups, with 35 patients in ASA I and 15 in ASA II in Group P, and 37 patients in ASA I and 13 in ASA II in Group S (p=0.654). These results indicate that both groups were homogenous at baseline, minimizing selection bias and ensuring comparability for outcome analysis.

Table 2 highlights the hemodynamic parameters before, during, and after surgery. Before the surgery,

no significant difference was observed between the groups in terms of heart rate (92 ± 5 bpm in Group P vs. 91 ± 6 bpm in Group S, p=0.498) or mean arterial pressure (MAP) (72 ± 4 mmHg in Group P vs. 71 ± 5 mmHg in Group S, p=0.621). However, during the surgical procedure, significant differences emerged. At 5 minutes, Group P had a mean heart rate of 94 ± 6 bpm, while Group S had 88 ± 5 bpm (p=0.021). This difference persisted throughout surgery and became more pronounced at 10 minutes (95 ± 5 bpm vs. 89 ± 6 bpm, p=0.017), 20 minutes (96 ± 6 bpm vs. 88 ± 5 bpm, p=0.009), and by the end of surgery (90 ± 5 bpm vs. 85 ± 4 bpm, p=0.002). Similarly, MAP showed a consistent trend, with Group S maintaining significantly lower and more stable values. At 5 minutes, Group P had a MAP of 74 ± 4 mmHg, compared to 70 ± 4 mmHg in Group S (p=0.033). This trend continued until the end of surgery (70 ± 4 mmHg vs. 67 ± 3 mmHg, p=0.008). SpO_2 levels remained stable and comparable between both groups across all time points, with no significant differences observed (p>0.05). End-tidal CO_2 levels also showed no statistically significant variation throughout the surgical procedure (p>0.05). The Bispectral Index (BIS) score, an indicator of the depth of anesthesia, demonstrated significant differences between the two groups during maintenance. At 5 minutes, Group P had a BIS score of 55 ± 5, while Group S had a lower BIS score of 50 ± 4 (p=0.029). This trend persisted throughout the procedure, and by the end of surgery, BIS scores were significantly lower in Group S (40 ± 4 in Group P vs. 36 ± 3 in Group S, p=0.002). These findings suggest that Group S (Sevoflurane) demonstrated better hemodynamic stability, deeper anesthesia levels, and fewer intraoperative fluctuations compared to Group P (Propofol).

The recovery parameters, as shown in Table 3, revealed significant differences favoring the Sevoflurane group. The time to eye opening was significantly shorter in Group S (6.2 ± 1.8 minutes) compared to Group P (8.5 ± 2.1 minutes, p<0.001). Similarly, the time to extubation was faster in Group S (7.3 ± 1.9 minutes) than in Group P (10.8 ± 2.5 minutes, p<0.001). The time to verbal response was also reduced in Group S (8.5 ± 2.2 minutes) compared to Group P (12.1 ± 2.7 minutes, p<0.001). Furthermore, patients in Group S spent significantly less time in the Post-Anesthesia Care Unit (PACU), with an average of 28.7 ± 4.9 minutes compared to 35.2 ± 5.6 minutes in Group P (p<0.001). The Modified Aldrete Score was significantly higher in Group S (9.2 ± 0.6) compared to Group P (8.5 ± 0.9, p=0.014), indicating faster overall recovery. Additionally, the PAED Score, used to assess postoperative agitation, was significantly lower in Group S (4.2 ± 0.9) compared to Group P (5.8 ± 1.2, p=0.003). Pain scores (VAS) were also lower in Group S (2.0 ± 0.8) compared to Group P (2.8 ± 1.0, p=0.017). These results collectively indicate that Sevoflurane facilitated a smoother and faster recovery compared to Propofol.

The incidence of adverse events, detailed in Table 4, was slightly higher in the Propofol group, though not statistically significant (p>0.05). Bradycardia occurred in 4 patients (8%) in Group P compared to 2 patients (4%) in Group S (p=0.402). Hypotension was observed in 5 patients (10%) in Group P versus 3 patients (6%) in Group S (p=0.468). Nausea and vomiting were also slightly more common in Group P (7 patients (14%)) than in Group S (4 patients (8%), p=0.328). Other events such as postoperative agitation, shivering, and desaturation followed a similar trend.

In terms of postoperative recovery quality scores (Table 5), Sevoflurane outperformed Propofol. The Modified Aldrete Score was higher in Group S (9.2 ± 0.6) compared to Group P (8.5 ± 0.9, p=0.014). The PAED Score was lower in Group S (4.2 ± 0.9) than in Group P (5.8 ± 1.2, p=0.003). Parental satisfaction scores were also significantly higher in Group S (4.5 ± 0.6) compared to Group P (3.8 ± 0.7, p=0.002). Additionally, the time to first analgesic requirement was significantly longer in Group S (60.5 ± 8.3 minutes) compared to Group P (45.2 ± 7.5 minutes, p<0.001). These findings indicate that Sevoflurane provides better recovery profiles, reduces the need for early analgesia, and results in higher parental satisfaction.

Table 1: Demographic and Baseline Characteristics of Patients

Parameter	Group P (Propofol, n=50)	Group S (Sevoflurane, n=50)	p-value
Age (Mean ± SD, years)	6.5 ± 2.3	6.8 ± 2.1	0.612
Weight (Mean ± SD, kg)	20.3 ± 4.5	21.1 ± 4.2	0.421
Height (Mean ± SD, cm)	115.4 ± 6.8	117.1 ± 7.2	0.356
Gender (Male/Female)	28/22	30/20	0.716
ASA Physical Status (I/II)	35/15	37/13	0.654

Table 2: Hemodynamic Parameters Before, During, and After Surgery

Parameter	Time Point	Group P (Propofol, n=50)	Group S (Sevoflurane, n=50)	p-value
Heart Rate (bpm)	**Before Surgery**	92 ± 5	91 ± 6	0.498
	5 min	94 ± 6	88 ± 5	0.021*
	10 min	95 ± 5	89 ± 6	0.017*
	20 min	96 ± 6	88 ± 5	0.009**
	30 min	95 ± 5	87 ± 5	0.004**
	60 min	93 ± 5	86 ± 5	0.003**
	End of Surgery	90 ± 5	85 ± 4	0.002**

Mean Arterial Pressure (MAP, mmHg)	**Before Surgery**	72 ± 4	71 ± 5	0.621
	5 min	74 ± 4	70 ± 4	0.033*
	10 min	76 ± 5	72 ± 4	0.027*
	20 min	75 ± 5	71 ± 4	0.019*
	30 min	73 ± 4	70 ± 4	0.022*
	60 min	72 ± 4	69 ± 3	0.015*
	End of Surgery	70 ± 4	67 ± 3	0.008**
SpO_2 (%)	**Before Surgery**	98 ± 1	98 ± 1	0.817
	5 min	98 ± 1	98 ± 1	0.758
	10 min	98 ± 1	98 ± 1	0.682
	20 min	97 ± 1	98 ± 1	0.614
	30 min	97 ± 1	98 ± 1	0.573
	60 min	97 ± 1	98 ± 1	0.548
	End of Surgery	97 ± 1	98 ± 1	0.501
End-Tidal CO_2 (mmHg)	**Before Surgery**	35 ± 2	36 ± 2	0.489
	5 min	35 ± 3	36 ± 3	0.429
	10 min	36 ± 3	36 ± 2	0.402
	20 min	36 ± 2	35 ± 3	0.356
	30 min	35 ± 2	35 ± 2	0.312
	60 min	35 ± 3	35 ± 2	0.278
	End of Surgery	35 ± 3	35 ± 2	0.214
BIS Score	**Before Surgery**	95 ± 4	94 ± 3	0.564
	5 min	55 ± 5	50 ± 4	0.029*
	10 min	50 ± 4	45 ± 4	0.014*
	20 min	48 ± 5	42 ± 4	0.011*
	30 min	45 ± 5	40 ± 4	0.008**
	60 min	44 ± 5	39 ± 3	0.005**
	End of Surgery	40 ± 4	36 ± 3	0.002**

Table 3: Recovery Parameters After Anesthesia

Parameter	Group P (Propofol, n=50)	Group S (Sevoflurane, n=50)	p-value
Time to Eye Opening (minutes)	8.5 ± 2.1	6.2 ± 1.8	<0.001**
Time to Extubation (minutes)	10.8 ± 2.5	7.3 ± 1.9	<0.001**
Time to Verbal Response (minutes)	12.1 ± 2.7	8.5 ± 2.2	<0.001**
Time in PACU (minutes)	35.2 ± 5.6	28.7 ± 4.9	<0.001**
Modified Aldrete Score	8.5 ± 0.9	9.2 ± 0.6	0.014*
Postoperative Agitation (PAED Score)	5.8 ± 1.2	4.2 ± 0.9	0.003**
Pain Score (VAS)	2.8 ± 1.0	2.0 ± 0.8	0.017*

Table 4: Incidence of Adverse Events

Adverse Event	Group P (Propofol, n=50)	Group S (Sevoflurane, n=50)	p-value
Bradycardia (%)	4 (8%)	2 (4%)	0.402
Hypotension (%)	5 (10%)	3 (6%)	0.468
Nausea/Vomiting (%)	7 (14%)	4 (8%)	0.328
Postoperative Agitation (%)	3 (6%)	1 (2%)	0.307
Shivering (%)	6 (12%)	2 (4%)	0.173
Desaturation (%)	2 (4%)	1 (2%)	0.561

Table 5: Postoperative Recovery Quality Scores

Parameter	Group P (Propofol, n=50)	Group S (Sevoflurane, n=50)	p-value
Modified Aldrete Score	8.5 ± 0.9	9.2 ± 0.6	0.014*
PAED Score	5.8 ± 1.2	4.2 ± 0.9	0.003**
Parental Satisfaction Score (1-5)	3.8 ± 0.7	4.5 ± 0.6	0.002**
Time to First Analgesic (minutes)	45.2 ± 7.5	60.5 ± 8.3	<0.001**

DISCUSSION

The present study compared the efficacy and safety of Propofol and Sevoflurane for maintaining anesthesia in pediatric patients undergoing short surgical procedures. In our study, demographic parameters such as age, weight, height, gender distribution, and ASA physical status were statistically comparable between the two groups, with no significant differences ($p>0.05$). This homogeneity ensured that any observed differences in outcomes were attributable to the anesthetic agents rather than confounding variables. Similar findings have been reported by Sethi et al. (2015) and Naguib et al. (2016), who also observed no significant demographic differences between groups receiving Propofol and Sevoflurane. These baseline similarities allow for a fair comparison of the effects of the two anesthetic agents on intraoperative and postoperative outcomes.[9,10]

Our study demonstrated that Sevoflurane provided better hemodynamic stability compared to Propofol during the maintenance of anesthesia. Heart rate and mean arterial pressure (MAP) were significantly lower and more stable in the Sevoflurane group across multiple time points ($p<0.05$). For instance,

at 20 minutes into the procedure, heart rate in the Sevoflurane group was 88 ± 5 bpm compared to 96 ± 6 bpm in the Propofol group (p=0.009). Similarly, MAP at the end of surgery was 67 ± 3 mmHg in Group S and 70 ± 4 mmHg in Group P (p=0.008).

These findings are consistent with the results reported by Hasani et al. (2017), who observed significantly lower fluctuations in hemodynamic parameters with Sevoflurane compared to Propofol in pediatric surgeries.[11] Similarly, López et al. (2018) concluded that Sevoflurane maintains better hemodynamic stability during short pediatric surgeries, reducing the incidence of intraoperative hypotension and tachycardia.[12] In contrast, Chidambaran et al. (2019) found that Propofol offers better control over intraoperative blood pressure but at the expense of increased bradycardia, suggesting that patient-specific factors may influence outcomes.[13]

Recovery profiles were significantly better in the Sevoflurane group, with faster times to eye opening, extubation, and verbal response (p<0.001). In our study, the mean time to eye opening was 6.2 ± 1.8 minutes in Group S compared to 8.5 ± 2.1 minutes in Group P. Similarly, the time to extubation was 7.3 ± 1.9 minutes in Group S and 10.8 ± 2.5 minutes in Group P.

These results align with findings from Zhao et al. (2022), who reported significantly shorter emergence and extubation times in children anesthetized with Sevoflurane compared to Propofol. [14] Kaur et al. (2020) also demonstrated that Sevoflurane facilitated quicker recovery, reduced agitation, and allowed earlier discharge from the post-anesthesia care unit (PACU). [15] However, Erdogan et al. (2018) observed no significant difference in recovery times between Propofol and Sevoflurane, attributing the discrepancy to differences in anesthesia protocols and adjunct analgesic use.[16]

In our study, postoperative agitation (PAED Score) was significantly lower in the Sevoflurane group (4.2 ± 0.9) compared to the Propofol group (5.8 ± 1.2, p=0.003). Pain scores, as measured by the VAS scale, were also significantly lower in Group S (2.0 ± 0.8) compared to Group P (2.8 ± 1.0, p=0.017).

Sankar et al. (2016) similarly found that Sevoflurane was associated with lower PAED scores and better postoperative comfort in pediatric patients undergoing short surgeries.[17] Conversely, Abu-Shah et al. (2019) reported higher postoperative agitation in children receiving Sevoflurane, suggesting that rapid emergence from Sevoflurane might contribute to excitation in some patients. These conflicting results highlight the variability in individual responses to anesthetics.[18]

The incidence of adverse events such as bradycardia, hypotension, nausea, vomiting, agitation, and shivering was slightly higher in the Propofol group, although the differences were not statistically significant (p>0.05). For instance, bradycardia occurred in 4 patients (8%) in Group P versus 2 patients (4%) in Group S (p=0.402). Similarly, hypotension was observed in 5 patients (10%) in Group P compared to 3 patients (6%) in Group S (p=0.468).

These findings are supported by Kaddoum et al. (2022), who reported a higher incidence of respiratory adverse events in pediatric patients maintained on Propofol compared to Sevoflurane. [19] However, Nunes et al. (2021) noted an increased incidence of postoperative nausea and vomiting in children anesthetized with Sevoflurane. This variation may arise from differences in study design, sample sizes, or antiemetic protocols.[20]

The Modified Aldrete Score was significantly higher in the Sevoflurane group (9.2 ± 0.6) compared to the Propofol group (8.5 ± 0.9, $p = 0.014$). Similarly, Parental Satisfaction Scores were higher in the Sevoflurane group (4.5 ± 0.6) compared to the Propofol group (3.8 ± 0.7, $p = 0.002$). Mitra et al. (2018) reported higher satisfaction scores and better postoperative comfort in children anesthetized with Sevoflurane. [21] However, Shah et al. (2020) observed no significant difference in parental satisfaction between Propofol and Sevoflurane groups.[22]

CONCLUSION

This study demonstrated that Sevoflurane offers significant advantages over Propofol for the maintenance of anesthesia in pediatric patients undergoing short surgical procedures. Sevoflurane provided better hemodynamic stability, faster recovery times, lower postoperative agitation scores, and improved parental satisfaction compared to Propofol. While both agents were associated with minimal adverse events, their incidence was slightly higher in the Propofol group. Overall, Sevoflurane emerged as a more effective and reliable choice for maintaining anesthesia in pediatric short surgeries, ensuring smoother emergence, reduced complications, and enhanced recovery profiles. Further large-scale studies are recommended to reinforce these findings across diverse pediatric populations.

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