RESEARCH PAPER

Evaluation Of Early Recovery Outcomes With Total Intravenous Anaesthesia Versus Inhalational Anaesthesia in Short Surgeries

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Abstract

Background: Short surgical procedures require anaesthetic techniques that provide rapid induction, stable intraoperative conditions, and quick postoperative recovery. Total intravenous anaesthesia (TIVA) and inhalational anaesthesia are commonly used techniques, each with distinct advantages regarding recovery characteristics and postoperative complications.

Aim: To compare the postoperative recovery profiles between total intravenous anaesthesia and inhalational anaesthesia in patients undergoing short surgical procedures.

Materials and Methods: This prospective comparative study was conducted in the Department of Anaesthesia at a tertiary-care teaching hospital affiliated with Meenakshi Medical College, Kanchipuram. A total of 60 patients undergoing elective short surgical procedures were included in the study. The patients were divided into two groups: Group A (n = 30) received total intravenous anaesthesia using propofol based anaesthesia, and Group B (n = 30) received inhalational anaesthesia using volatile agents. Demographic characteristics, intraoperative hemodynamic parameters, duration of surgery, and postoperative recovery parameters including time to eye opening, response to verbal commands, orientation, postoperative nausea and vomiting, and recovery criteria were recorded. Statistical analysis was performed using appropriate statistical tests, and a p value less than 0.05 was considered statistically significant.

Results: Demographic characteristics were comparable between the two groups. Patients receiving total intravenous anaesthesia demonstrated better intraoperative hemodynamic stability. Postoperative recovery parameters including time to eye opening (6.8 ± 2.1 vs 9.7 ± 2.6 minutes), response to verbal commands (7.9 ± 2.3 vs 11.4 ± 2.9 minutes), and time to orientation (10.2 ± 3.1 vs 14.6 ± 3.5 minutes) were significantly shorter in the TIVA group (p = 0.001). The incidence of postoperative nausea and vomiting was also lower in the TIVA group.

Conclusion: Total intravenous anaesthesia provides faster postoperative recovery, improved hemodynamic stability, and lower incidence of postoperative nausea and vomiting compared with inhalational anaesthesia in short surgical procedures.

Keywords: Total intravenous anaesthesia, inhalational anaesthesia, postoperative recovery, short surgical procedures, propofol, postoperative nausea and vomiting.

How to cite this article: Reddy CC, Namasivayam SA, Prasath A, Tejaswi A. Evaluation of Early Recovery Outcomes with Total Intravenous Anaesthesia Versus Inhalational Anaesthesia in Short Surgeries. Int J Drug Deliv Technol. 2026;16(12s): 432-436. DOI: 10.25258/ijddt.16.12s.50

Introduction

Short surgical procedures are commonly performed in modern clinical practice and require anaesthetic techniques that provide rapid induction, adequate intraoperative conditions, and smooth as well as rapid postoperative recovery [1]. Early recovery after anaesthesia is particularly important in short-duration surgeries because it allows faster patient mobilization, reduced postoperative complications, and improved operating room efficiency. Therefore, the selection of an appropriate anaesthetic technique plays a crucial role in determining the quality of postoperative recovery and overall patient satisfaction [2].

Two commonly used anaesthetic techniques for short surgical procedures are total intravenous anaesthesia (TIVA) and inhalational anaesthesia [3]. Total intravenous anaesthesia involves the administration of intravenous agents such as propofol, often in combination with short acting opioids, to induce and maintain anaesthesia without the use of volatile agents. TIVA has gained increasing attention due to its predictable pharmacokinetic profile, rapid emergence from anaesthesia, and lower incidence of postoperative nausea and vomiting. In addition, propofol based anaesthesia is known to provide smoother recovery and

improved patient comfort in the postoperative period [4].

Inhalational anaesthesia, on the other hand, involves the administration of volatile anaesthetic agents such as sevoflurane, desflurane, or isoflurane for the maintenance of anaesthesia. These agents are widely used because they allow easy titration of anaesthetic depth and provide stable intraoperative conditions [5,6]. Modern inhalational agents have relatively rapid onset and recovery characteristics, which make them suitable for short surgical procedures. However, some studies have reported that inhalational anaesthesia may be associated with a higher incidence of postoperative nausea and vomiting, airway irritation, and delayed recovery when compared with intravenous anaesthetic techniques [7,8].

Recovery characteristics such as time to eye opening, response to verbal commands, orientation, and readiness for discharge are important indicators of the quality of anaesthesia in short surgical procedures [9]. Faster recovery not only improves patient satisfaction but also contributes to efficient utilization of healthcare resources. Previous studies have demonstrated variations in postoperative recovery profiles between total intravenous anaesthesia and inhalational anaesthesia, highlighting the need for further evaluation in different clinical settings [10,11]. Therefore, the present study was undertaken to compare the postoperative recovery profiles between total intravenous anaesthesia and inhalational anaesthesia in patients undergoing short surgical procedures.

Materials and Methods

This prospective comparative study was conducted in the Department of Anaesthesia at a tertiary care teaching hospital attached to Meenakshi Medical College, Kanchipuram, Tamil Nadu. The study included patients undergoing short surgical procedures under general anaesthesia during the study period. A total of 60 patients were enrolled in the study and were divided into two groups based on the anaesthetic technique used. Group A consisted of 30 patients who received total intravenous anaesthesia (TIVA), while Group B included 30 patients who underwent inhalational anaesthesia.

Patients aged between 18 and 60 years who were scheduled for elective short surgical procedures with an expected duration of less than 60 minutes and classified as American Society of Anesthesiologists (ASA) physical status I or II were included in the study. Patients with severe systemic diseases (ASA III or above), known allergy to anaesthetic agents, pregnancy, or those who refused consent were excluded from the study.

All patients underwent a detailed preoperative evaluation including medical history, physical examination, and routine laboratory investigations. Standard monitoring, including electrocardiography, non invasive blood pressure, pulse oximetry, and respiratory rate was applied for all patients during surgery.

In Group A, anaesthesia was induced and maintained using intravenous propofol along with short acting opioids to achieve total intravenous anaesthesia. In Group B, anaesthesia was induced using intravenous agents and maintained using inhalational anaesthetic agents such as sevoflurane with oxygen and nitrous oxide. Various parameters related to postoperative recovery were recorded, including time to eye opening, response to verbal commands, time to orientation, incidence of postoperative nausea and vomiting, and time to achieve recovery criteria. Hemodynamic parameters and intraoperative events were also monitored and recorded.

The collected data were entered into Microsoft Excel and analyzed using SPSS statistical software. Descriptive statistics such as mean, standard deviation, frequency, and percentage were calculated. Comparative analysis between the two groups was performed using appropriate statistical tests. A p value less than 0.05 was considered statistically significant.

Results

A total of 60 patients undergoing short surgical procedures were included in the study. The patients were divided into two groups based on the anaesthetic technique used: Group A (Total Intravenous Anaesthesia, n = 30) and Group B (Inhalational Anaesthesia, n = 30).

Table 1: Demographic Characteristics of Study Participants (n = 60)

Variable	TIVA (n = 30)	Inhalational Anaesthesia (n = 30)	p value
Mean age (years)	36.4 ± 9.2	37.1 ± 8.7	0.74
Male	16 (53.3%)	17 (56.7%)	0.79
Female	14 (46.7%)	13 (43.3%)	
Mean BMI (kg/m²)	24.6 ± 3.1	25.2 ± 3.4	0.48
ASA I	18 (60%)	17 (56.7%)	0.79
ASA II	12 (40%)	13 (43.3%)	

The demographic characteristics were comparable between the two groups. There was no statistically significant difference in age, gender distribution, BMI, or ASA classification ($p > 0.05$).

Table 2: Intraoperative Hemodynamic Parameters

Parameter	TIVA (n = 30)	Inhalational Anaesthesia (n = 30)	p value
Mean systolic BP (mmHg)	116.8 ± 9.4	121.6 ± 10.2	0.04
Mean diastolic BP (mmHg)	72.5 ± 6.8	76.9 ± 7.4	0.03
Mean heart rate (beats/min)	70.6 ± 7.9	77.3 ± 8.2	0.01

Patients receiving TIVA demonstrated significantly better hemodynamic stability with lower systolic blood pressure, diastolic blood pressure, and heart rate compared with those receiving inhalational anaesthesia ($p < 0.05$).

Table 3: Duration of Surgery and Anaesthesia

Parameter	TIVA (n = 30)	Inhalational Anaesthesia (n = 30)	p value
Duration of surgery (minutes)	38.6 ± 9.1	39.8 ± 8.7	0.59
Duration of anaesthesia (minutes)	46.3 ± 10.4	47.9 ± 9.8	0.54

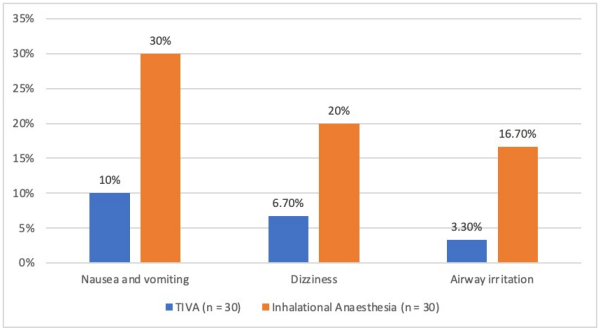
The mean duration of surgery and anaesthesia was similar between the two groups, and the differences were not statistically significant ($p > 0.05$).

Table 4: Postoperative Recovery Parameters

Parameter	TIVA (n = 30)	Inhalational Anaesthesia (n = 30)	p value
Time to eye opening (minutes)	6.8 ± 2.1	9.7 ± 2.6	0.001
Response to verbal command (minutes)	7.9 ± 2.3	11.4 ± 2.9	0.001
Time to orientation (minutes)	10.2 ± 3.1	14.6 ± 3.5	0.001

Patients in the TIVA group demonstrated significantly faster postoperative recovery, including earlier eye opening, response to verbal commands, and orientation compared with the inhalational anaesthesia group ($p = 0.001$).

Figure 1: Postoperative Complications



Postoperative nausea and vomiting were significantly lower in the TIVA group compared with the inhalational anaesthesia group ($p = 0.04$). Other complications were more frequent in the inhalational anaesthesia group but did not reach statistical significance.

Table 5: Recovery and Discharge Readiness

Outcome	TIVA (n = 30)	Inhalational Anaesthesia (n = 30)	p value
Time to achieve recovery criteria (minutes)	18.6 ± 4.3	24.8 ± 5.1	0.001
Patient satisfaction score	8.7 ± 1.1	7.5 ± 1.3	0.002

Patients receiving total intravenous anaesthesia achieved recovery criteria significantly earlier compared with those receiving inhalational anaesthesia ($p = 0.001$). Patient satisfaction scores were also significantly higher in the TIVA group ($p = 0.002$).

Discussion

The present study compared the postoperative recovery profiles between total intravenous anaesthesia (TIVA) and inhalational anaesthesia in patients undergoing short surgical procedures. In this study, the baseline demographic characteristics such as age, gender distribution, body mass index, and ASA physical status were comparable between the two groups. The mean age in the TIVA group was 36.4 ± 9.2 years compared with 37.1 ± 8.7 years in the inhalational anaesthesia group, and the difference was not statistically significant ($p = 0.74$). These findings indicate that both groups were similar at baseline and comparable for evaluating postoperative recovery outcomes. Similar observations have been reported in previous studies evaluating recovery characteristics following different anaesthetic techniques [12].

Intraoperative hemodynamic parameters in the present study demonstrated better stability in patients receiving total intravenous anaesthesia. The mean systolic blood pressure (116.8 ± 9.4 mmHg vs 121.6 ± 10.2 mmHg; $p = 0.04$), diastolic blood pressure (72.5 ± 6.8 mmHg vs

76.9 ± 7.4 mmHg; p = 0.03), and heart rate (70.6 ± 7.9 beats/min vs 77.3 ± 8.2 beats/min; p = 0.01) were significantly lower in the TIVA group compared with the inhalational anaesthesia group. These findings suggest improved intraoperative hemodynamic stability with propofol based anaesthesia. Comparable results have been reported in previous research demonstrating that TIVA provides stable cardiovascular parameters during short surgical procedures [13].

The duration of surgery and anaesthesia was similar in both groups, and the difference was not statistically significant (p > 0.05). This indicates that the type of anaesthetic technique did not influence the operative duration in the present study. Similar findings have been reported in previous studies evaluating different anaesthetic techniques for short duration procedures [14].

An important finding of the present study was the significantly faster postoperative recovery observed in patients receiving total intravenous anaesthesia. The mean time to eye opening (6.8 ± 2.1 minutes vs 9.7 ± 2.6 minutes; p = 0.001), response to verbal commands (7.9 ± 2.3 minutes vs 11.4 ± 2.9 minutes; p = 0.001), and time to orientation (10.2 ± 3.1 minutes vs 14.6 ± 3.5 minutes; p = 0.001) were significantly shorter in the TIVA group compared with the inhalational anaesthesia group. These findings indicate a faster emergence profile with propofol based anaesthesia. Similar observations have been reported in studies that demonstrated faster recovery with total intravenous anaesthesia in short surgical procedures [15].

Postoperative complications such as nausea and vomiting were also significantly lower in the TIVA group (10%) compared with the inhalational anaesthesia group (30%) (p = 0.04). This finding suggests that propofol based anaesthesia may reduce the incidence of postoperative nausea and vomiting. Similar results have been reported in previous studies which observed that TIVA is associated with lower rates of postoperative nausea and vomiting compared with volatile anaesthetic agents [16,17].

Furthermore, patients receiving total intravenous anaesthesia achieved recovery criteria significantly earlier (18.6 ± 4.3 minutes vs 24.8 ± 5.1 minutes; p = 0.001) and demonstrated higher patient satisfaction scores (8.7 ± 1.1 vs 7.5 ± 1.3; p = 0.002) compared with patients receiving inhalational anaesthesia. Similar findings have been reported in previous studies which demonstrated improved recovery profiles and greater patient satisfaction with total intravenous anaesthesia in short surgical procedures [18].

Overall, the findings of the present study suggest that total intravenous anaesthesia provides faster recovery, improved hemodynamic stability, and reduced postoperative complications when compared with inhalational anaesthesia in patients undergoing short surgical procedures.

Conclusion

Total intravenous anaesthesia demonstrated better intraoperative hemodynamic stability and faster postoperative recovery compared with inhalational anaesthesia in patients undergoing short surgical procedures. Recovery parameters such as time to eye opening, response to verbal commands, and orientation were significantly shorter in the total intravenous anaesthesia group. Additionally, the incidence of postoperative nausea and vomiting was lower, and patients achieved recovery criteria earlier with higher satisfaction levels. Overall, total intravenous anaesthesia appears to be a preferable technique for short surgical procedures due to its favorable recovery profile and reduced postoperative complications.

Conflict of Interest: Nil

Source of Funding: Nil

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