

Patient Satisfaction, Postoperative Symptoms, and Peri-anaesthetic Awareness Following General Anaesthesia: A Prospective Observational Study

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ABSTRACT

Introduction: General Anaesthesia (GA) is an integral component of modern surgical care, providing unconsciousness, analgesia, and amnesia during operative procedures. Patient satisfaction has emerged as an important indicator of the quality of anaesthetic care, reflecting the overall perioperative experience, including communication, comfort, symptom management, and recovery.

Aim: To assess patient satisfaction, postoperative outcomes, and intraoperative awareness following GA among adult patients undergoing surgery.

Materials and Methods: This prospective questionnaire-based observational study was conducted in the Department of Anaesthesiology at Dr. DY Patil Medical College, Hospital and Research Centre, Pimpri, Pune, Maharashtra, India, from February 2025 to March 2026. A total of 150 adult patients with American Society of Anaesthesiologists (ASA) physical status I-III undergoing surgery under GA were enrolled. Patient satisfaction, postoperative symptoms, and awareness were assessed using the Bauer Patient Satisfaction Questionnaire and Modified Brice Questionnaire at 1st, 6th, 12th, and 24th postoperative hours. Data were analysed using IBM Statistical Package for Social Sciences (SPSS) Statistics version 27.0. Continuous variables

were expressed as Mean±Standard Deviation (SD), categorical variables as frequencies and percentages.

Results: A total of 150 patients were included, 84 (56.0%) males and 66 (44.0%) females. Of the procedures, 104 were elective, and 46 were emergency. Most postoperative symptoms were absent or moderate in severity, with only 7 (4.7%) patients reporting severe pain at the surgical site and 10 (6.7%) experiencing severe Postoperative Nausea and Vomiting (PONV). Satisfaction with perioperative information, recovery from anaesthesia, pain management, and overall care remained consistently high. Among them, 8 patients (5.3%) reported intraoperative awareness, whereas 141 (94.0%) reported no dreams during anaesthesia. The most common last memory before induction was seeing the operating theatre in 98 patients (65.3%), while the first memory after recovery was being in the recovery room in 62 (41.3%). Pain in 63 patients (42.0%) and anxiety in 48 patients (32.0%) were the most frequently reported concerns.

Conclusion: GA was associated with high patient satisfaction, favourable perioperative outcomes, low incidence of awareness, and minimal severe postoperative adverse effects. Effective communication, perioperative management, and symptom control contributed to a positive patient experience.

Keywords: Anaesthesia recovery period, Intraoperative awareness, Postoperative complications, Postoperative nausea and vomiting, Quality of health care

INTRODUCTION

Anaesthesiology has evolved from a speciality primarily focused on ensuring unconsciousness and physiological stability during surgery to one that emphasises patient-centered care, safety, comfort, and the overall perioperative experience. Advances in anaesthetic techniques, monitoring standards, and perioperative management have significantly improved surgical outcomes while reducing anaesthesia-related morbidity and mortality. Consequently, assessment of healthcare quality has expanded beyond traditional clinical outcomes to include patient-reported outcomes and satisfaction measures. Patient satisfaction is now regarded as an important indicator of the quality of anaesthetic care because it reflects patients' perceptions of communication, emotional support, symptom management, comfort, and confidence in healthcare providers. Sinbukhova E and Lubnin A and Alsaif A et al., highlighted the importance of patient satisfaction as a valuable measure of quality anaesthetic care [1,2].

GA remains one of the most widely employed anaesthetic techniques for elective and emergency surgical procedures. It produces a

reversible state of unconsciousness, amnesia, analgesia, and muscle relaxation, thereby facilitating safe surgical intervention. Despite its well-established safety profile, many patients experience anxiety related to anaesthesia because of concerns regarding pain, loss of control, intraoperative awareness, postoperative complications, and recovery. Imbelloni LE et al., demonstrated the effectiveness of GA in modern surgical practice, whereas Brown EN et al., described the principles and application of multimodal GA [3,4].

The perioperative period comprises preoperative, intraoperative, and postoperative phases, each contributing significantly to patients' overall perception of care. Effective preoperative counselling, clear communication, and appropriate management of expectations improve satisfaction, whereas inadequate information may result in dissatisfaction despite favourable clinical outcomes. Smooth induction, maintenance, emergence from anaesthesia, and minimal postoperative discomfort further enhance patient experience. Similar observations have been reported by Groot JAN et al., Walker EMK et al., George M et al., and Teunkens A et al., [5-8].

The postoperative period is often considered the strongest determinant of patient satisfaction. Common complaints such as pain, nausea, vomiting, sore throat, hoarseness, thirst, shivering, dizziness, and confusion may adversely affect recovery and overall perception of anaesthetic care. Effective symptom management, timely intervention, and empathetic healthcare interactions improve recovery and satisfaction. Apfelbaum JL et al., and Chapman R and Vierck C emphasised the importance of postoperative pain management [9,10], whereas Walker EMK et al., George M et al., and Chalasani SH et al., demonstrated that postoperative symptoms significantly influence patient-reported outcomes [6,7,11].

Patient satisfaction is a multidimensional concept influenced by demographic characteristics, psychological status, previous anaesthetic experiences, cultural background, and patient expectations. Satisfaction depends not only on favourable clinical outcomes but also on whether patient expectations are adequately fulfilled. Wang Y et al., demonstrated the influence of psychosocial factors on patient satisfaction, Kim EJ et al., highlighted the importance of patient-centered communication, and Nicolescu TO emphasised continuous quality improvement in anaesthetic practice [12-14].

Several investigators have evaluated patient satisfaction using validated assessment tools. Sinbukhova E and Lubnin A, Alsaif A et al., and Chalasani SH et al., reported that communication, perioperative information, postoperative pain, and discomfort are major determinants of patient satisfaction [1,2,11]. Likewise, Walker EMK et al., George M et al., Teunkens A et al., and Novakovic SS et al., demonstrated the usefulness of structured questionnaires for evaluating perioperative satisfaction and identifying factors associated with dissatisfaction [6-8,15].

Although previous Indian studies by Banwait S and Gupta M, Chalasani SH et al., and George M et al. have evaluated patient satisfaction following GA, most have focused primarily on patient satisfaction and perioperative experience, with relatively limited comprehensive assessment of postoperative discomfort, peri-anaesthetic recall, and intraoperative awareness, particularly in tertiary care teaching hospitals. Therefore, Institution-specific evidence is required to identify opportunities for improving patient-centred perioperative care [7,11,16]. Hence, the present study aimed to evaluate patient satisfaction and overall experience with GA among adult patients undergoing surgery.

The primary objective was to evaluate patient satisfaction and overall experience with GA. The secondary objectives were to assess postoperative discomforts; evaluate patient satisfaction with perioperative information, recovery from anaesthesia, pain management, PONV management, and overall anaesthetic care; determine the incidence of intraoperative awareness, dreaming, and peri-anaesthetic recall using the Modified Brice Questionnaire; and identify the most common concerns and unpleasant experiences reported during the perioperative period.

MATERIALS AND METHODS

This prospective questionnaire-based observational study was conducted in the Department of Anaesthesiology, Dr DY Patil Medical College, Hospital and Research Centre, Pimpri, Pune, from February 2025 to March 2026. Ethical clearance was obtained from the Institutional Ethics Committee (Approval No. IESC/PGS/2024/157), and the study was registered with the Clinical Trials Registry of India (CTRI/2025/02/079843). Written informed consent was obtained from all participants prior to enrollment.

Sample size calculation: The sample size was calculated using the following formula:

$$n = (Z^2 \times p \times q) / d^2$$

Where:

- n=required sample size
- Z=standard normal deviate at 95% confidence interval=1.96

- p=prevalence of the most frequent postoperative discomfort (pain at the surgical site) reported by Chalasani SH et al., [11]=37.26% (0.3726)
- q=1-p=62.74% (0.6274)
- d=allowable error=10% (0.10)

Substituting the values:

$$n = (1.96^2 \times 0.3726 \times 0.6274) / (0.10)^2$$

$$n = (3.8416 \times 0.3726 \times 0.6274) / 0.01$$

$$n = (3.8416 \times 0.2338) / 0.01$$

$$n = 0.898 / 0.01$$

$$n = 89.8$$

Therefore, the minimum required sample size was 90 participants. To improve the precision of the study and account for potential incomplete responses, a total of 150 patients were enrolled.

Inclusion criteria: Adult patients aged ≥ 18 years, belonging to ASA Physical Status I-III, scheduled for elective or emergency surgery under able to read and understand Marathi, Hindi, or English, and willing to provide written informed consent.

Exclusion criteria: Patients aged < 18 years, those with neurological or psychiatric conditions that impaired comprehension or the ability to complete the study questionnaires, patients who were too unwell or confused to complete the questionnaire, obstetric patients, terminally ill patients, those unwilling to participate, and patients with ASA physical status IV or higher were excluded from the study. Patients meeting any of the exclusion criteria were not enrolled.

Study Procedure

The comprehensive pre-anaesthetic examination of every patient included a general systemic examination, a detailed airway assessment, and a review of laboratory investigations, such as a complete blood count, renal and liver function tests, serum electrolytes, coagulation profile, chest radiography, and an Electrocardiogram (ECG). A detailed pre-anaesthetic assessment was performed for all patients, which included documentation of demographic characteristics, history of present illness, co-morbid medical conditions, previous surgical and anaesthetic exposure, current medications, history of drug or food allergies, and relevant family history. Findings from the general physical examination, systemic examination, airway assessment, and preoperative investigations were also recorded and reviewed before administration of anaesthesia.

On the day of surgery, after the patient was transferred to the operating room, standard monitors were attached, and baseline vital signs were recorded. A 20-G intravenous cannula was inserted, and an infusion of Ringer's lactate or normal saline was initiated. The premedication was intravenous glycopyrrolate 0.2 mg to reduce secretions, midazolam 0.02-0.03 mg/kg for anxiolysis, and fentanyl 1-2 μ g/kg for analgesia. For three minutes, the patient was preoxygenated with 100% oxygen to increase oxygen reserves.

Anaesthesia induction was achieved with intravenous propofol, administered in titrated aliquots of 1.5-2.5 mg/kg until the eyelash reflex was lost and no verbal response was observed. Muscle relaxation during intubation was achieved with succinylcholine 1.5-2 mg/kg. Atracurium 0.5 mg/kg or vecuronium 0.1 mg/kg was used in patients who were contraindicated from receiving depolarising muscle relaxants. Endotracheal intubation was performed with the help of suitable laryngoscope blades, and the appropriate size of the endotracheal tube used was 8.0-8.5 mm internal diameter for males and 7.0-7.5 mm internal diameter for females. Correct tube positioning was confirmed by auscultation and capnography.

Maintenance of anaesthesia was achieved with sevoflurane (1-2%) or isoflurane (1-1.5%) in a mixture of oxygen and nitrous oxide or air. An additional dose of atracurium 0.1 mg/kg or vecuronium 0.02 mg/kg was administered to maintain sufficient relaxation. The additional

fentanyl dose of 0.5-1 µg/kg was based on haemodynamic indicators of analgesic requirement. Heart rate, ECG rhythm, Non Invasive Blood Pressure (NIBP), Oxygen saturation (SpO₂), End-tidal Carbon dioxide (EtCO₂), and minimum alveolar concentration were continuously monitored throughout the surgery. After the surgical operation, the residual neuromuscular blockade was reversed with neostigmine 0.05 mg/kg and glycopyrrolate 0.008 mg/kg. The extubation criteria included adequate spontaneous ventilation, the presence of protective airway reflexes, and a haemodynamically stable patient. Later, the patients were transported to the postoperative recovery area, where monitoring and supportive care were continued.

Postoperative evaluations were performed at the 1st, 6th, 12th, and 24th postoperative hours using the Bauer Patient Satisfaction Questionnaire and the Modified Brice Questionnaire [11]. These structured instruments were used to assess postoperative discomfort, patient satisfaction, intraoperative awareness, and peri-anaesthetic recall. No permission was obtained from the original developer, as the questionnaire is used as part of routine clinical assessment and the collected data were de-identified. The responses were carefully recorded in the data collection forms.

The item regarding willingness to recommend the anaesthetic service to friends and family was also omitted, as it was not directly related to the predefined primary and secondary objectives of the study. In addition, the symptom "feeling cold" was assessed as postoperative shivering, and headache was included as an additional postoperative symptom because it was frequently reported by patients during the study period and was therefore evaluated systematically.

1. Drowsiness
2. Pain at the site of surgery
3. Thirst
4. Hoarseness
5. Sore throat
6. Nausea or vomiting
7. Confusion or disorientation
8. Pain at the site of the anaesthetic injection
9. Shivering
10. Headache
11. Awareness under GA
 - Perioperative information
 - Waking up
 - Pain therapy
 - PONV therapy
 - Overall care
 - What is the last thing you remember before going to sleep?
 - What is the first thing you remember after waking up?
 - Do you remember anything between going to sleep and waking up?
 - Did you dream during the procedure?
 - Were your dreams disturbing to you?
 - What was the worst thing about your operation?

STATISTICAL ANALYSIS

The data were entered into Microsoft Excel spreadsheets. Statistical analysis was performed using IBM SPSS statistics version 27.0. Quantitative variables were expressed as mean±standard deviation.

RESULTS

A total of 150 patients were included in the study. The study population demonstrated a slight male predominance, and the

largest proportion of participants belonged to the age group above 60 years. Most surgical procedures were elective, indicating that most patients underwent planned surgical interventions rather than emergency operations [Table/Fig-1].

Parameters	Category	n (%)
Age group (years)	18-30	33 (22.0)
	31-40	27 (18.0)
	41-50	26 (17.3)
	51-60	26 (17.3)
	>60	38 (25.3)
	Total	150 (100)
Gender	Male	84 (56.0)
	Female	66 (44.0)
	Total	150 (100)
Type of surgery	Elective	104 (69.3)
	Emergency	46 (30.7)
	Total	150 (100)

[Table/Fig-1]: Demographic profile and type of surgery (N=150).

Postoperative complaints were generally mild, with most patients reporting either no symptoms or only moderate symptoms. Severe postoperative adverse effects were infrequent across all parameters, suggesting satisfactory perioperative management and favourable recovery following GA [Table/Fig-2].

Parameters	Mild (n, %)	Moderate (n, %)	Severe (n, %)	Total (N)
Drowsiness	82 (54.7)	68 (45.3)	0	150
Pain at surgical site	77 (51.3)	66 (44.0)	7 (4.7)	150
Thirst	105 (70.0)	40 (26.7)	5 (3.3)	150
Hoarseness	100 (66.7)	44 (29.3)	6 (4.0)	150
Sore throat	95 (63.3)	51 (34.0)	4 (2.7)	150
Nausea and vomiting	105 (70.0)	35 (23.3)	10 (6.7)	150
Confusion/disorientation	125 (83.3)	20 (13.3)	5 (3.3)	150
Pain at injection site	100 (66.7)	44 (29.3)	6 (4.0)	150
Shivering	110 (73.3)	35 (23.3)	5 (3.3)	150
Headache	100 (66.7)	40 (26.7)	10 (6.7)	150

[Table/Fig-2]: Distribution of participants according to severity of postoperative complaints.

Patient satisfaction remained consistently high across all postoperative assessment periods. More than 90% of patients reported being very satisfied with perioperative information and overall care, while satisfaction with recovery from anaesthesia and pain management also remained uniformly high. Dissatisfaction was minimal, reflecting a positive overall perception of anaesthetic care [Table/Fig-3].

Most patients had no intraoperative recall and did not experience dreams during anaesthesia, indicating effective amnesia associated with GA. Among the few patients who reported awareness or dreaming, the experiences were generally non distressing. Pain and anxiety were identified as the most commonly reported unpleasant aspects of the surgical experience, highlighting their importance in determining overall patient perception and satisfaction [Table/Fig-4].

Parameters	1 Hour	6 Hours	12 Hours	24 Hours
Perioperative information	VS:137,	VS:138,	VS:136,	VS:136,
	S:11,	S:10,	S:12,	S:12,
	D:1,	D:2,	D:2,	D:2,
	VD:1,	VD:0,	VD:0,	VD:0,
	NA:0	NA:0	NA:0	NA:0

Waking up	VS:129,	VS:130,	VS:132,	VS:135,
	S:15, D:5,	S:14, D:5,	S:13,	S:12, D:3,
	VD:1, NA:0	VD:1,	D:5,	VD:0,
		NA:0	VD:0,	NA:0
			NA:0	
Pain therapy	VS:129,	VS:130,	VS:130,	VS:130,
	S:14, D:6,	S:13, D:6,	S:14,	S:14, D:5,
	VD:1, NA:0	VD:1,	D:5,	VD:1,
		NA:0	VD:1,	NA:0
			NA:0	
PONV therapy	VS:3, S:2,	VS:3, S:1,	VS:2,	VS:2, S:3,
	D:4, VD:0,	D:3,	S:3, D:2,	D:2,
	NA:141	VD:0,	VD:0,	VD:0,
		NA:143	NA:143	NA:143
Overall care	VS:135,	VS:137,	VS:137,	VS:138,
	S:15	S:13	S:13	S:12

[Table/Fig-3]: Satisfaction with perioperative information, waking up from anaesthesia, pain therapy, PONV therapy, overall care.

VS: Very satisfied; S: Satisfied; D: Dissatisfied; VD: Very dissatisfied; NA: Not applicable

Question	Response	n (%)
What was the last thing you remember before going to sleep?	Seeing the operating theatre	98 (65.3)
	Hearing voices	17 (11.3)
	No specific recollection	13 (8.7)
	Others	22 (14.7)
What was the first thing you remember after waking up?	Recovery room	62 (41.3)
	Hearing voices	56 (37.3)
	Seeing the operating theatre	14 (9.3)
	No recollection	15 (10.0)
	Others	3 (2.0)
Do you remember anything between going to sleep and waking up?	No	142 (94.7)
	Yes	8 (5.3)
Did you dream during the procedure?	No	141 (94.0)
	Yes	9 (6.0)
Were your dreams disturbing to you?	No	14 (9.3)
	Yes	14 (9.3)
What was the worst thing about your operation?	Pain	63 (42.0)
	Anxiety	48 (32.0)
	Recovery process	19 (12.7)
	Awareness	5 (3.3)
	Inability to perform usual activities	10 (6.7)
	Other concerns	5 (3.3)

[Table/Fig-4]: Questions regarding dreaming and peri-anaesthetic recall.

DISCUSSION

The present study demonstrated a high level of patient satisfaction with GA across all domains evaluated, including perioperative information, recovery from anaesthesia, pain management, PONV management, and overall anaesthetic care. These findings highlight the effectiveness of contemporary anaesthetic practices in providing a positive perioperative experience. Patient satisfaction is increasingly recognised as an important indicator of healthcare quality and reflects not only technical competence but also communication, empathy, and responsiveness to patient needs. Similar observations have been reported by Sinbukhova E and Lubnin A, Alsaif A et al., and Banwait S and Gupta M, who emphasised the importance of patient-centered perioperative care in achieving favourable satisfaction outcomes [1,2,16].

Postoperative discomfort remains one of the most important determinants of patient satisfaction following GA. In the present

study, most postoperative symptoms were either absent or mild to moderate in severity, indicating satisfactory perioperative symptom control. Pain at the surgical site emerged as the most commonly reported postoperative complaint, while symptoms such as sore throat, hoarseness, thirst, shivering, headache, and confusion or disorientation occurred less frequently and were generally well tolerated. Similar findings have been reported by Chalasani SH et al., who identified postoperative pain as a major contributor to patient discomfort following GA [11]. Walker EMK et al., and George M et al., also observed that effective management of postoperative symptoms significantly influences patient perception of anaesthetic care and overall satisfaction [6,7]. These findings reinforce the importance of multimodal analgesia and proactive symptom management in enhancing recovery and patient experience.

Communication and perioperative information play a critical role in shaping patient expectations and satisfaction. In the current study, satisfaction with perioperative information remained consistently high throughout the postoperative assessment period, suggesting that patients felt adequately informed and reassured regarding their anaesthetic care. Effective communication between anaesthesiologists and patients has been shown to reduce anxiety, improve trust, and enhance overall satisfaction. Similar observations were reported by Alsaif A et al., and Teunkens A et al., who demonstrated that patients who received clear explanations regarding anaesthesia and perioperative care reported higher satisfaction levels [2,8]. Adequate preoperative counselling may therefore represent an important and modifiable factor contributing to improved patient-centred outcomes.

The quality of emergence from anaesthesia and recovery experience also strongly influences patient perceptions of care. In the present study, satisfaction with waking up from anaesthesia and pain therapy remained high throughout the postoperative period, reflecting effective intraoperative and postoperative management strategies. Furthermore, satisfaction with overall care remained consistently favourable, indicating that patients viewed their perioperative experience positively. Similar findings have been reported by Novakovic SS et al., and Banwait S and Gupta M, who found that smooth recovery, effective pain control, and attentive postoperative care were among the strongest predictors of overall patient satisfaction [15,16]. These observations emphasise that successful anaesthetic care extends beyond intraoperative management and includes careful attention to postoperative recovery and comfort.

Awareness under GA remains an important concern for both patients and anaesthesiologists because of its potential psychological consequences. In the present study, most patients reported no intraoperative awareness or recall, and the incidence of dreaming was low. Among those reporting dreams or recall, the experiences were generally non distressing. These findings suggest that the anaesthetic techniques employed provided adequate hypnosis and amnesia in the majority of patients. Similar observations have been reported by Chalasani SH et al., and by Fetene MB et al., who documented a low incidence of awareness and peri-anaesthetic recall among patients receiving GA [11,17]. The findings of the present study therefore support the continued effectiveness of modern anaesthetic practices in minimising awareness-related events.

An additional finding of the present study was that pain and anxiety were the most frequently identified unpleasant aspects of the surgical experience. This observation highlights the complex and multidimensional nature of patient satisfaction, which is influenced not only by physical symptoms but also by psychological factors. Previous studies by Walker EMK et al., George M et al., and Teunkens A et al., and similarly reported that perioperative anxiety and concerns regarding surgery can influence patient perceptions despite favourable clinical outcomes [6-8]. These findings underscore the need for comprehensive perioperative care that addresses

both physical discomfort and emotional well-being through patient education, reassurance, and supportive communication.

Overall, the findings of the present study are consistent with existing literature demonstrating that high-quality anaesthetic care, effective communication, appropriate symptom management, and prevention of awareness contribute significantly to positive patient experiences. The study adds to the growing body of evidence supporting routine assessment of patient satisfaction as an important quality indicator in anaesthetic practice and highlights opportunities for further enhancement of patient-centred perioperative care [1,2,11,16,17].

Limitation(s)

The present study has certain limitations. First, it was conducted at a single tertiary care teaching hospital, which may limit the generalisability of the findings to other healthcare settings and populations. Second, the study included only 150 participants, and a larger sample size may have provided more robust estimates of patient satisfaction and perioperative experiences. Third, patient satisfaction was assessed using self-reported questionnaires, making the results susceptible to response and recall bias. Fourth, satisfaction levels may have been influenced by individual patient expectations, cultural factors, educational status, and previous healthcare experiences, which were not analysed separately. Finally, the study evaluated patient experiences only upto 48 hours postoperatively; therefore, long-term satisfaction and delayed postoperative outcomes were not assessed.

CONCLUSION(S)

The present study demonstrated a high level of patient satisfaction with GA across all assessed domains, including perioperative information, recovery from anaesthesia, pain management, and overall care. Most postoperative complaints were absent or mild to moderate in severity, with only a small proportion of patients experiencing severe symptoms, indicating effective perioperative management. The incidence of intraoperative awareness and disturbing dreams was low, suggesting that GA provided adequate amnesia and patient comfort during surgical procedures. Pain and anxiety were identified as the most common concerns reported by patients, highlighting areas where targeted interventions may further improve the perioperative experience. These findings emphasise the importance of effective communication, symptom control, and patient-centred care in enhancing satisfaction with anaesthetic services. Overall, GA was found to be safe, well tolerated, and associated with favourable patient-reported outcomes in the studied population.

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- Plagiarism X-checker: May 06, 2026
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