ORIGINAL ARTICLE

Propofol-based Sedation versus Conventional Anesthesia in Endoscopic Interventions

*Kazi Shariful Islam[1], Samar Chandra Saha[2], Shariful Islam Seraji[3], Mohammad Zikrul Hoque[4], A.M. Delwar Hossain[5]

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Abstract:

Background: Gastrointestinal endoscopy is essential for diagnosing and treating gastrointestinal conditions. Procedural efficiency, patient safety, and satisfaction all depend on the choice of sedation. Although propofol-based sedation has been popular due to its rapid onset and fast recovery, this study compares the safety and efficacy of propofol-based sedation versus conventional anesthesia during gastrointestinal endoscope procedures. Methods: This retrospective observational study occurred in the Department of Anesthesia-Analgesia & Intensive Care Unit, Holy Family Red Crescent Medical College Hospital, from August 2022 to July 2024. A total of 120 patients were equally divided into two groups based on sedation type. Data on procedural parameters, recovery time, hemodynamic stability, patient satisfaction, and adverse events were analyzed. Results: Sedation with propofol significantly reduced procedure duration (38.5±10.2 vs. 43.6±11.5 minutes; p=0.01) and recovery time (15.5±5.4 vs. 35±15.5 minutes; p<0.001). Supplemental oxygen requirements were significantly lower (11.7% vs. 28.3%; p=0.02), along with higher patient satisfaction scores (4.6±0.5 vs. 4.2±0.6; p<0.001) for patients receiving propofol. In addition to fewer adverse events, the propofol group had fewer prolonged recovery times (0% vs. 10%; p=0.01). Conclusion: Gastrointestinal endoscopic procedures were well suited for propofol-based sedation, as propofol performed better on all measures associated with efficiency, patient recovery, patient satisfaction, and adverse events. Continuous monitoring is required to mitigate respiratory risks.

Key words: Gastrointestinal endoscopy, propofol sedation, conventional anesthesia, recovery outcomes, adverse effects.

1. Assistant Professor, Department of Anesthesia-Analgesia & Intensive Care Unit, Holy Family Red Crescent Medical College, Dhaka, Bangladesh.
2. Assistant Professor, Department of Anesthesia-Analgesia & Intensive Care Unit, Holy Family Red Crescent Medical College, Dhaka, Bangladesh.
3. Assistant Professor, Department of Anesthesia-Analgesia & Intensive Care Unit, Holy Family Red Crescent Medical College, Dhaka, Bangladesh.
4. Assistant Professor, Department of Anesthesia-Analgesia & Intensive Care Unit, Holy Family Red Crescent Medical College, Dhaka, Bangladesh.
5. Resident Medical Officer, Department of Anesthesia-Analgesia & Intensive Care Unit, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh.

*Corresponding Author: sharonustc@gmail.com

Introduction:

Gastrointestinal (GI) endoscopy is a central pillar of modern diagnostic and therapeutic medicine that minimally invades the GI tract to address several GI conditions. The effectiveness of endoscopy heavily depends on optimal sedation techniques that ensure patient comfort, facilitate procedural efficiency and minimize complications. A widely used sedative, propofol has become the drug of choice for its rapid onset, predictable pharmacokinetic properties,

and rapid reversal[1,2]. Its potential for respiratory depression and hemodynamic instability makes this a careful product to be evaluated in clinical practice despite these advantages[3].

The combination of midazolam and opioids as sedimentation protocols is effective in conventional sedation in endoscopic procedures. However, these regimens tend to be followed by long recovery times and a greater risk of complications related to sedation.[4] Propofol-based sedation can provide deep but controllable sedation with fewer interruptions during procedures by trained personnel[5]. However, propofol is particularly suitable for complex interventions, including endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic submucosal dissection (ESD)[6].

The choice of sedation influences procedural outcomes and healthcare system efficiency. Propofol's shorter recovery time has been demonstrated to reduce procedure-related delays and improve resource utilization in high-volume centers[7]. In addition, propofol has a favorable patient tolerance, which makes it a preferred choice in the outpatient setting, where patient satisfaction significantly impacts care adherence[8]. However, given the risks of respiratory depression, especially in high-risk populations, propofol should be used with continuous monitoring[9].

This study aims to determine propofol-based sedation's comparative efficacy and safety compared to conventional anesthesia during GI endoscopic procedures. It examines procedure and recovery times, hemodynamic stability, patient satisfaction, and adverse effects to provide evidence-based insights for sedation practices. This study optimizes endoscopic care by focusing on critical sedation factors. This study compared the efficacy and safety of propofol-based sedation versus conventional anesthesia in patients undergoing gastrointestinal endoscopic procedures.

Methodology:

This retrospective observational study was conducted at the Department of Anesthesia-Analgesia & Intensive Care Unit, Holy Family Red Crescent Medical College Hospital, from August 2022 to July 2024. One hundred twenty patients undergoing gastrointestinal endoscopic procedures were included in this study, and they were equally divided into two groups based on anesthesia techniques. One group used propofol-based sedation techniques, and another used conventional anesthesia.

Inclusion Criteria:

- Patients aged between 18–65 years.
- ASA (American Society of Anesthesiologists) classification I–III.
- Scheduled for elective upper or lower GI endoscopic procedures.

Exclusion Criteria:

- Propofol or sedative agent's allergy.
- Patients with severe cardiorespiratory disease.
- Pregnant or breastfeeding individuals.
- Emergency endoscopic procedures.

Data collection: Medical records of patients who receive GI endoscopic procedures were utilized, and their data were collected. Demographic details, procedural parameters (i.e., duration, recovery time), sedation type (propofol-based or conventional anesthesia), clinical outcomes, adverse events, and scores for patient satisfaction with these services were included in this information. The data extraction form was standardized for consistency and accuracy. All record anonymity and work in the strictest data protection protocols were undertaken during the study to maintain patient confidentiality.

Statistical analysis of data: Statistical analysis was done using SPSS version 25. Continuous variables (age, BMI, procedure duration, and recovery time) were expressed as mean ± standard deviation and compared using an independent t-test. Categorical variables (sex, ASA classification, adverse events, and supplemental oxygen requirements) were presented as frequencies and percentages and

analyzed via chi-square or Fisher's exact test. Patient satisfaction scores were assessed using the Mann-Whitney U test due to non-parametric distribution, and a p-value of <0.05 indicated statistical significance.

Results:

Table 1: Baseline characteristics (n=120)

Characteristics		Propofol Group (n=60)	Conventional Group (n=60)	P value
Age		45.0 ± 9.5	46.7 ± 10.5	0.35
Sex	Male	36	38	0.72
	Female	24	22	
BMI		26.2 ± 4.0	25.5± 3.5	0.3
ASA Class	1	24 (40.0%)	29 (48.3%)	0.06
	2	19 (31.7%)	24 (40.0%)	
	3	17 (28.3%	7 (11.7%)	
Comorbidities		18 (30.0%)	20 (33.33%)	0.69

The groups had similar mean ages (Propofol: 45.0 ± 9.5 years, Conventional: 46.7 ± 10.5 years; p=0.35). There were slightly more males in both groups (Propofol: 60%, Conventional: 63.3%; p=0.72). BMI was comparable (Propofol: 26.2 ± 4.0, Conventional: 25.5 ± 3.5; p=0.3). ASA classification distribution was alike, with no significant difference (p=0.06). Comorbidities were present in 30% of the Propofol group and 33.33% of the Conventional group (p=0.69).

Table 2: Procedure and duration of Endoscopy (n=120)

Parameter		Propofol Group (n=60)	Conventional Group (n=60)	p-value
Procedure Type	Upper GI	23 (38.3%)	26 (43.3%)	0.8
	Lower GI	37 (61.7%)	34 (56.7%)	
Procedure Duration (min)		38.5±10.2	43.6±11.5	0.01
Recovery Time (min)		15.5±5.4	35±15.5	<0.001

Table 2 presents procedural parameters such as type, duration, and recovery time for both groups. Lower GI tract procedures were more common in both groups (Propofol: 61.7%; Conventional: 56.7%; p=0.8). The Propofol group had a significantly shorter mean procedure duration (38.5 ± 10.2 minutes) compared to the Conventional group (43.6 ± 11.5 minutes; p=0.01), indicating greater efficiency with propofol sedation. Recovery time was also significantly faster in the Propofol group (15.5 ± 5.4 minutes) than in the Conventional group (35 ± 15.5 minutes; p<0.001).

Table 3: Endoscopic outcome (n=120)

Parameter	Propofol Group (n=60)	Conventional Group (n=60)	p-value
Hemodynamic Stability	55 (91.7%)	51 (85.0%)	0.25
Patient Satisfaction (score 1–5)	4.6±0.5	4.2±0.6	<0.001
Supplemental Oxygen Requirement	7 (11.7%)	17 (28.3%)	0.02

Table 3 shows key outcomes such as hemodynamic stability, patient satisfaction, and the need for supplemental oxygen. Hemodynamic stability was slightly higher in the Propofol group (91.7%) compared to the Conventional group (85.0%), though not statistically significant (p=0.25). Patient satisfaction, rated on a scale of 1 to 5, was significantly higher in the Propofol group (4.6 ± 0.5) than in the Conventional group (4.2 ± 0.6; p<0.001). The need for supplemental oxygen was significantly lower in the Propofol group (11.7%) compared to the Conventional group (28.3%; p=0.02).

Table 4: Endoscopic adverse effect (n=120)

Parameter	Propofol Group (n=60)	Conventional Group (n=60)	p-value
Hypotension	5 (8.3%)	9 (15.0%)	0.25
Bradycardia	3 (5.0%)	7 (11.7%)	0.18
Nausea/Vomiting	5 (8.3%)	11 (18.3%)	0.1
Airway obstruction	1 (1.7%)	5 (8.3%)	0.09
Prolonged recovery time	0 (0.0%)	6 (10.0%)	0.01

Table 4 outlines adverse effects in both groups. The Propofol group had lower rates of adverse events, including hypotension (8.3% vs. 15.0%; p=0.25), bradycardia (5.0% vs. 11.7%; p=0.18), and nausea/vomiting (8.3% vs. 18.3%; p=0.1). Airway obstruction was less frequent in the Propofol group (1.7% vs. 8.3%; p=0.09). Prolonged recovery time was absent in the Propofol group (0%) but observed in 10% of the Conventional group (p=0.01).

Discussion:

These results show that propofol-based sedation considerably outperforms conventional anesthesia in gastrointestinal endoscopic procedures. This efficiency was underscored by shorter procedural durations (38.5±10.2 vs. 43.6±11.5 min, p=0.01) and shorter recovery periods (15.5 ± 5.4 vs. 35 ± 15.5 min, p < 0.001), as seen by minor improvements in either cardinal measure in the cohort of Hofman el al. and Qadeer el al. using Propofol Reduction of recovery times allows for more significant reductions in turnaround times, which benefits high volume endoscopy centers by increasing throughput and reducing turnover times [10,11].

There was a marked difference in patient satisfaction scores measured on a 4.6±0.5 in the propofol group vs. 4.2±0.6 in the conventional group (p<0.001). This evidence is similar to Kim et al., who found patients sedated with propofol were more comfortable[12]. As Liu et al. have also shown, propofol offers superior patient experiences, particularly in conjunction with adjunctive agents such as lidocaine, to lessen the harmful effects of propofol [13].

The hemodynamic stability is a significant issue in this study, and this study found that the patients in the propofol group required less supplemental oxygen (11.7 % versus 28.3 %; p = 0.02). This is consistent with the findings of Riphaus et al. and Ogawa et al., who noted lower incidences of respiratory complications with propofol sedation [14, 15]. However, Eberl et al. suggest that, although there was no difference in the incidence of transient hypotension or bradycardia between the two groups, continuous vigilance is still advocated due to the difficulties with monitoring these events[16].

The favorable safety profile of the propofol group (mainly sparing prolonged recovery times: 0% vs 10%; p=0.01) is consistent with its reduced adverse effects. Similar trends were demonstrated by Goyal et al., citing fewer sedation-related complications when using agents than traditional agents[17]. Despite this, the risk of respiratory depression induced by propofol remains, as pointed out by Park et al. and Coté et al., who also stressed the need for personnel with experience in undertaking sedation-related complications[18,19].

This study's findings are compared with Seifert et al.'s, and the consistent advantage of propofol's procedural efficiency and safety is evident[4]. Additionally, with emerging techniques, such as target-controlled infusion (TCI) pumps, explored by Fanti et al., we may further optimize propofol sedation, reliability, and precision[20].

This study replicated previous findings but extended this research by assessing the broadly nuanced differences in sedation outcomes, especially in a controlled and comparative setting. Further studies should examine long-term outcomes and cost implications associated with propofol-based sedation in heterogeneous patients undergoing a range of modalities.

Conclusion:

These advantages of propofol-based sedation over conventional anesthesia for gastrointestinal endoscopic procedures include reduced procedure and recovery times, greater patient satisfaction, and fewer adverse events. Its favorable safety and efficiency profiles suit it, especially in high-volume centers—nevertheless, respiratory depression potential demands continuous observation by trained personnel. This study shows that propofol plays a role in optimizing endoscopic care, but it is important to be vigilant to avoid compromising patient safety. Further research should focus on long-term outcomes and cost-effectiveness.

Limitations and recommendations:

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole comLack of long-term outcome assessment further restricts the findings. Future multicenter studies with larger cohorts should assess long-term outcomes, cost-effectiveness, and patient safety in diverse populations to strengthen evidence supporting propofol-based sedation in endoscopic procedures.

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