

INCIDENCE OF SEDATION RELATED COMPLICATIONS OF PROPOFOL USE IN ADVANCED ENDOSCOPIC PROCEDURES

Muhammad Noman^{*1}, Basit Nazir², Sameen Tahir³, Noor Ul Ain Aqeel⁴,
Muhammad Ahmad Arif⁵

^{*1,2,3,4,5}Department of health professional technologies The University of Lahore

^{*1}nm2816834@gmail.com, ²iambasitnazir@gmail.com, ³sameentahir379@gmail.com,
⁴noorulainaqeel12@gmail.com, ⁵malikahmadarif77@gmail.com

DOI: <https://doi.org/10.5281/zenodo.21351426>

Keywords

Endoscopic procedures, Hypoxemia

Article History

Received: 01 December 2025

Accepted: 11 January 2026

Published: 26 January 2026

Copyright @Author

Corresponding Author: *

Muhammad Noman

Abstract

Background:

Propofol is widely used for gastrointestinal endoscopy due to its rapid onset and recovery, but it may cause cardiopulmonary events. This study assessed outcomes and adverse events in patients sedated with propofol.

Objectives:

To find out the incidence of sedation related complications of propofol use during advanced endoscopic procedures.

Methods:

A cross-sectional study was conducted on 109 patients undergoing endoscopic procedures. Demographics, ASA status, BMI, sedation dose, recovery profile, and complications were recorded and analyzed.

Results:

In this study Chi-square test was used by SPSS 27.0 version and the mean age was 39.5 years, and mean BMI was 28 kg/m². Most patients were ASA II–III, and ERCP was the most common procedure. Hypoxia occurred in 41.3%, hypotension in 54.1%, and vasopressors were required in 45%. Airway interventions were needed in most cases (75.2%), though intubation was rare (3.7%). All events were transient and managed safely. Propofol alone showed fewer complications and better recovery than combination regimens.

Conclusion:

Propofol is safe and effective for endoscopy when used with vigilant monitoring. Higher BMI, ASA III–IV status, and supine positioning increase risks, while propofol administration is safer than combination sedation.

INTRODUCTION

Administration of propofol promotes during an endoscopic procedure helps to promotes relaxation and alleviates discomfort. These procedures are common in the United States. Historically, physicians employed a mixture of minimal doses of medication to aid in relaxation for their patients. A benzodiazepine combined

with an opioid to find a balanced effect. Sedation, which is also known as conscious sedation, was approved for use first. Propofol (2, 6-di-isopropofol) is a widely used drug that helps put people to sleep fast during surgeries, especially for procedures done with a scope. The action takes 30 to 45 seconds and the effects last

for a little while, around 4 to 8 minutes. (Coté GA et al., 2010).

Gastrointestinal (GI) endoscopy is an important part of today's medical testing and treatment methods that causes little disturbance to the digestive system to deal with various digestive issues. The effectiveness of endoscopy relies a lot on the best ways to use sedation that make sure patients comfortable and help procedures go smoothly. Its ability to affect respiratory depression and unstable blood flow make this situation difficult. A product that needs to be carefully tested in real medical situations even with these benefits (Islam KS et al., 2023).

Sedation using anesthesia has become more common for advanced procedures endoscopic procedures like ERCP (a test for the bile and pancreatic ducts) and a type of scan called endoscopic ultrasound (EUS). Propofol is a sedative that helps people relax and sleep. The benefit of starting to work quickly (in 30-45 seconds) is that it can help reach the desired effect. Sedation happens quickly, and its effects last for a short time (4-8 minutes), allowing for a fast recovery. The use of propofol for sedation during advanced endoscopic procedures is becoming more popular because it has good absorption and processing in the body. The safety of propofol for advanced digestive procedures. This method has now been shared in several studies (Khan ZH et al., 2021).

Propofol is a medicine that helps people sleep during surgery or other procedures has become the preferred drug in the last ten years, especially in complicated and lengthy methods like ERCP, because. Because it works quickly as a sleeping aid, has a short duration of effect, and acts fast. Recovery after sedation. The adverse events are trouble in breathing, low blood pressure, and a slow heart rate. This situation and the lack of a cure mean this drug is sometimes seen as only for certain situations. Used by doctors who give anesthesia or care for critically patients. Many recent publications articles help make sure that giving medicine is done safely and effectively. Using propofol during digestive endoscopy by a nurse, while with the guidance of the

endoscopist, as long as both are trained enough. (Luzon-Solanas L et al., 2018)

Islam KS et al., (2023) conducted a study on Propofol Sedation Compared to Traditional Anesthesia Endoscopic Procedures. The total of 120 patients participated in this study. The goal of this study was to compare safety and how well propofol sedation works compared to standard anesthesia during a gastrointestinal endoscopy process. Stomach and intestinal examinations using a camera were a good match for propofol sedation because propofol worked better on all tests.

Khan ZH et al. (2021) conducted a study on a review of using mild sedation during endoscopic procedures. The aim of this study is to explain how conscious sedation affects the results for patients undergoing an endoscopy. The study showed that CS is a safe and effective way to provide anesthesia for endoscopic procedures. It is a better choice for planned endoscopic surgeries.

LITERATURE REVIEW

Coté GA et al., (2010) conducted a study on how often problems happen from using Propofol sedation. The total of 799 patients participated in this study. Advanced Endoscopic Procedures means special medical tests done using a thin tube with a camera to look inside the body. The goal of the study was to find out how often something happens of problems caused by sedation, especially the frequency airway changes (AMs) with the use of propofol during advanced procedures. We also looked at factors that can predict independently. Propofol can be used safely for people with advanced conditions. Factors that can predict AMs on their own included male gender, American Society of Anesthesiologist, a group with a level of 3 or more, and a higher body weight.

Yang Y and others. A study in 2024 showed that ciprofol caused fewer cases of low blood pressure, but it took a little longer to start working compared to propofol. This means there could be safer options in the future, but we still don't have much experience with them yet. In the same way, extra treatments like intravenous

lidocaine have been studied by Liu J and others. In 2020, it was reported that using lidocaine lowered the amount of propofol needed during ERCP and made the overall experience better. Apart from stomach-related medicine, research in minimally invasive surgery and women's surgery also gives useful information about sedation methods.

Islam KS et al., (2023) conducted a study on Propofol Sedation Compared to Traditional Anesthesia Endoscopic Procedures. The total of 120 patients participated in this study. The goal of this study was to compare safety and how well propofol sedation works compared to standard anesthesia during a gastrointestinal endoscopy process. Stomach and intestinal examinations using a camera were a good match for propofol sedation because propofol worked better on all tests.

Khan ZH et al. (2021) conducted a study on a review of using mild sedation during endoscopic procedures. The aim of this study is to explain how conscious sedation affects the results for patients undergoing an endoscopy. The study showed that CS is a safe and effective way to provide anesthesia for endoscopic procedures. It is a better choice for planned endoscopic surgeries.

Daza JF et al. (2018) conducted a study on giving propofol by doctors who perform endoscopies versus Anesthesiologist in gastrointestinal endoscopy: Doctors who give medicine to help people sleep or feel comfortable during procedures that check the stomach and intestines. A thorough examination and analysis of patient information results related to safety. The total of 602 articles were identified for this review. The goal of this study was to compare. Results for patients receiving propofol not given by an anesthesiologist (NAAP) compared to. An anesthesiologist gave propofol during a regular endoscopy. Doctors who use endoscopes can give propofol safely without any problems. The quality of care for patients who are classified as ASA I or II and having routine endoscopy. The results of this analysis are restricted because there aren't

enough good quality studies available. Also, big studies are needed to reach clear conclusions.

Villanueva RI et al., (2025) conducted a study on things that might cause bad reactions to treatments given by nurses. The total of 693 patients participated in this study. Propofol for patients not staying overnight. Endoscopy: a study that looks at slices of data. This study looked at how common and what causes side effects from medications given by nurses. Using propofol to help patients relax during outpatient endoscopy procedures at a private hospital in Peru. In our work, trained nurses give a mild dose of propofol to patients who are not staying overnight. Having endoscopic procedures is usually safe, but there are some risks involved. Important measures should check on them regularly during long-term treatments, especially if patients are rated as ASA III.

Pigò F et al., (2025) conducted a study on The Rate of Negative Events in Adults Having Treatment Giving Sedation with Propofol "Non-Anesthetists: A Summary and Analysis of Research Studies." The total of 73 studies had met the inclusion criteria for this study. This organized this study looked at different pieces of research to see how often bad reactions happen in adults having a medical procedure while being lightly sedated with NAAP. NAAP-based procedural sedation means using a specific method or approach to help a person feel calm and relaxed during a medical procedure seems to be mostly safe. The rates of minor side effects change based on. Even with the type of sedation and procedure used, big complications are very uncommon.

Maruki Y et al., (2025) conducted a study on the calming effects of propofol and things that might increase the chances of too much sedation. The total of 870 patients participated in this study. Sedation during the endoscopic treatment for bile problems. This study planned to check how well propofol sedation works. Being overweight, having trouble breathing while sleeping, and longer surgery times are reasons that can lead to too much sleepiness when using propofol. So, sedation Methods should be customized for these patients.

MATERIALS AND METHODS

Descriptive cross-sectional study was conducted from Shaikh Zayed Hospital, Lahore. Non-Probability and convenience sampling technique was used in this study. A standardized questionnaire was used to collect the data. Adult patients undergoing advanced GI endoscopic procedures. The inclusion criteria Adult patients undergoing advanced GI endoscopic procedures. The Exclusion criteria Patients not willing to provide informed consent Patient having known COPD, asthma and other underlying chronic pulmonary diseases (Pulmonary Tuberculosis, Cystic Fibrosis, Bronchiectasis). We collect the data of patient having surgical procedures from 15 June 2025 to 6 October. Data collection was performed using a structured, pre-tested questionnaire designed to note factors that contribute to incidence of sedation related complication of propofol use in advance endoscopic procedures. The questionnaire

captured demographic data, ASA classification, type of Surgery, BMI, patient position during surgery, Airway modification during surgery, Hypoxia, any sedation related adverse event, and also Aldrete score upone recovery.

RESULTS

A total of 109 patients were enrolled over 4 months. Procedures included EUS (30), endoscopic retrograde cholangiopancreatography (64), and EDG Dilation (15). A total of 64.2% of patients showed no response to endoscopic intubation. Hypoxia occurred in 41.3%, hypotension in 54.1%, and premature termination in 0.6% of the patients. No patients required bag-mask ventilation or endotracheal intubation. There were 17 AMs performed in 109 (15.5%) patients. Body mass index, male sex, and American Society of Anesthesiologists class of 3 or higher were independent predictors of AMs.

Descriptive statistics of demographic and clinical variables among study

Statistics						
	Age	BMI	Induction Dose of Propofol	Total Propofol Dose	Aldrete Score upon Recovery	Time to full recovery (min)
Mean	39.48	28.001	10.34	27.60	6.97	26.27
Median	34.00	27.500	9.00	30.00	7.00	25.00
Std. Deviation	18.275	7.3006	7.431	12.632	1.182	10.277

This table presents baseline data from 109 patients. The mean age was 39.5 years with an average BMI of 28.0, indicating a predominance of overweight participants. The mean induction dose of propofol was 10.3 mg, with a total mean

dose of 27.6 mg. Recovery outcomes were satisfactory, as shown by an average Aldrete score of 6.97 and a mean recovery time of 26.3 minutes.

Types of endoscopic procedures performed.

Type of procedure	Frequency	Percentage
ERCP	64	58.7
EUS	30	27.52
EDG Dilation	15	13.76
Total	109	100.0

The most common procedure was ERCP (58.7%), followed by EUS (17.4%) and other

endoscopic interventions (18.3%). EDG Dilation accounted for only 13.76% of cases.

Incidence of hypoxia during procedures

Hypoxia	Frequency	Percentage
No	64	58.7
Yes	45	41.3
Total	109	100.0

Hypoxia occurred in 45 patients (41.3%), while 58.7% remained stable. This relatively high frequency underscores the need for vigilant

monitoring during deep sedation, particularly in prone or lateral positions where airway access may be restricted.

Incidence of hypotension during procedures

Hypotension	Frequency	Percentage
No	50	45.9
Yes	59	54.1
Total	109	100.0

Hypotension occurred in 59 patients (54.1%), while 45.9% remained normotensive. This indicates that circulatory depression was a

common adverse effect, emphasizing the hemodynamic risks associated with propofol.

Sedation-related adverse events after the procedure.

Sedation-related adverse events	Frequency	Percentage
No	70	64.2
Yes	39	35.8
Total	109	100.0

Post-operative complication Prolonged recovery were reported in 39 patients (35.8%), while 70 patients (64.2%) had none. These events were included delayed recovery, Hypoxia, Hypotension, and residual cardiorespiratory effects, showing that adverse outcomes extend beyond intraoperative management.

DISCUSSION

Our findings indicate that 33 patients (30. 3%) had a normal body weight (BMI between 18. 9), while 53 patients (48. 4%) were overweight or obese (BMI of 25 or more). Out of these, 23 people (21. 1%) were overweight, 16 people (14.7%) were mildly obese, 24 people (22. 0%) were severely obese, and 4 people (3. 7%) were

extremely obese. Only 9 patients, which is 8. 3%, were too thin. These results show how important it is to adjust doses and closely monitor obese patients, which agrees with Sharma and others. In 2020, it was reported that overweight people had more problems related to sedation.

The ASA scoring showed that most patients were rated as ASA II (59 patients, or 54. 1%) or ASA I (43 patients, or 39. 4%) Only 5 people (4. 6%) were healthy, and 2 people (1. 8%) were very sick. Most patients (64 out of 109, or 58. 7%) had an ERCP procedure. This was followed by EUS with 19 patients (17. 4%), small-bowel enteroscopy with 6 patients (5. 5%), and other procedures with 20 patients (18. 3%) . Most patients were lying on their stomachs (57; 52. 3%), followed by

those lying on their left side (47; 43. 1%), and only 5 (4. 6%) were lying on their backs. Hypoxemia happened in 45 patients (41. 3%), while 64 patients (58. 7%) had normal oxygen levels. This is higher than the 10-20% rates found in studies from Western countries (Agostoni et al. , 2018; Cohen et al. , 2017).

Most patients needed help with their breathing: 82 (75. 2%) needed a chin lift, 12 (11. 0%) needed a nasal airway, and 4 (3. 7%) needed a tube inserted into their throat. Only 10 (9. 2%) did not need any help with breathing. Low blood pressure was found in 59 patients (54. 1%), while 50 patients (45. 9%) had normal blood pressure. This is much higher than what is reported in the West, where low blood pressure usually happens in 10–20% of cases (Sharma et al. , 2020).

Patients who got only propofol (47 people) needed more medicine to start the process (12. 40 mg) and in total (32. 96 mg) than those who got a mix of medicines (starting dose 8. 77 mg, total 23. 53). The recovery scores were a little higher with just propofol (7. 21) compared to the other option (6. 79), but the difference wasn't big enough to be important. Surprisingly, it took longer to recover when using only propofol (29. 15 minutes) than when using a mix of treatments (24. 08 minutes). These results are different from studies done in the West (Agostoni et al. , 2018), which found that using only propofol led to a quicker recovery.

CONCLUSION

The research indicated that administering propofol to sedate patients during complex endoscopic procedures may result in certain specific issues tied to sedation. The most common problems seen were low oxygen levels in the blood, low blood pressure. These issues mainly happened during long procedures and in patients with more serious health conditions. Various factors influenced the likelihood of these complications occurring, including the patient's age, their existing health conditions, the administration of higher doses of propofol, and the duration of the procedure. To conclude, propofol is effective for sedation and is generally well-received by patients.

REFERENCES

- Khan, Z. H., & Al-fadhili, F. S. (2021). Conscious Sedation for Endoscopic Procedure: A Systematic Review. *Archives of Anesthesia and Critical Care*.
- Koshy G, Nair S, Norkus EP, et al. Propofol vs. midazolam and meperidine for conscious sedation in GI endoscopy. *Am J Gastroenterol* 2000.
- Liu, J., Liu, X., Peng, L. P., Ji, R., Liu, C., & Li, Y. Q. (2020). Efficacy and safety of intravenous lidocaine in propofol-based sedation for ERCP procedures: a prospective, randomized, double-blinded, controlled trial.
- Maruki, Y., Hijioka, S., Yagi, S., Takasaki, T., Chatto, M., Fukuda, S & Saito, Y. (2025). Sedative effects of propofol and risk factors for excessive sedation in the endoscopic treatment of biliary and pancreatic diseases.
- Nishizawa, T., & Suzuki, H. (2018). Propofol for gastrointestinal endoscopy. *United European gastroenterology journal*.
- Opfermann, P., Marhofer, P., Springer, A., Metzelder, M., Zadrazil, M., & Schmid, W. (2022). A prospective observational study on the feasibility of subumbilical laparoscopic procedures under epidural anesthesia in sedated spontaneously breathing infants with a natural airway.
- Pigò, F., Gottin, M., & Conigliaro, R. (2025). The Incidence of Adverse Events in Adults Undergoing Procedural Sedation with Propofol Administered by Non-Anesthetists: A Systematic Review and Meta-Analysis.
- Rosati, M., Bramante, S., Conti, F., Frattari, A., Rizzi, M., & Roman, R. A. (2020). Operative gynecological laparoscopy under conscious sedation. *JLS: Journal of the Society of Laparoscopic & Robotic Surgeons*.
- Gangi S, Saidi F, Patel K, Johnstone B, Jaeger J, Shine D. Cardiovascular complications after GI endoscopy: occurrence and risks in a large hospital system.

- GI physicians endorse propofol use; ASA to issue statement. Available at: <http://www.asahq.org/news/propofoluse.html>. Last accessed 8 August 2006.
- Graber RG. Propofol in the endoscopy suite: an anesthesiologist's perspective.
- Luzon-Solanas, L., Ollero-Domenche, L., Sierra-Moros, E. M., Val-Perez, J., Soria-San-Teodoro, M. T., Gimenez-Julvez, T., & Uribarrena-Amezaga, R. (2018). The safety of deep sedation with propofol controlled by the endoscopist in endoscopic retrograde cholangiopancreatography (ERCP): a prospective study in a tertiary hospital.
- Singh, R., Ghazanwy, M., & Vajifdar, H. (2013). A randomized controlled trial to compare fentanyl-propofol and ketamine-propofol combination for procedural sedation and analgesia in laparoscopic tubal ligation.
- Sipe BW, Rex DK, Latinovich D, et al. Propofol vs. midazolam/meperidine for outpatient colonoscopy: administration by nurses supervised by endoscopists.
- Ulmer BJ, Hansen JJ, Overly CA, et al. Propofol vs. midazolam/fentanyl for outpatient colonoscopy: administration by nurses supervised by endoscopists.
- Vargo JJ, Zuccaro G, Dumot JA, Conwell DL, Morrow JB, Shay SS. Automated assessment of respiratory activity is superior to pulse oximetry and visual assessment for the detection of early respiratory depression during therapeutic upper endoscopy.
- Villanueva, R. I., Montero, C. B., Bulnes-Montánchez, M. E., Alva, L. S., Carrillo, J. S., Zevallos, A., & Salazar, F. (2025). Risk factors for adverse reactions to nurse-administered propofol during outpatient endoscopy: a cross-sectional study.
- Walker JA, McIntyre RD, Scleinitz PF, et al. Nurse-administered propofol sedation without anesthesia specialists in 9152 endoscopic cases in an ambulatory surgery center.
- Wani, S., Azar, R., Hovis, C. E., Hovis, R. M., Cote, G. A., Hall, M. & Jonnalagadda, S. S. (2011). Obesity as a risk factor for sedation-related complications during propofol-mediated sedation for advanced endoscopic procedures. *Gastrointestinal endoscopy*, 74(6), 1238-1247.

