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INCIDENCE OF COMPLICATIONS FOLLOWING PROPOFOL INDUCTION IN ANESTHESIA, PATIENTS

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Abstract

Propofol is a popular intravenous anesthetic drug for inducing general anesthesia due to its quick onset, short duration of action, and acceptable recovery profile. However, its administration is usually linked with cardiovascular and respiratory problems, which might jeopardize patient safety throughout the induction phase. The purpose of this prospective observational research was to establish the occurrence of problems after propofol induction and assess their relationship to patient characteristics and perioperative variables. From March to July 2026, the study was carried out at the Operation Theatre of District Headquarters (DHQ) Hospital in Haripur, Pakistan. A convenience sampling method was used to enroll 100 patients undergoing elective surgery under general anesthesia with propofol induction.Descriptive statistics and Chi-square tests were utilized to identify relationships. A p-value of <0.05 was considered statistically significant. Overall, 84% of individuals had problems, with 16% experiencing no adverse events. The most prevalent problem was hypotension (35%), followed by tachycardia (16%), hypertension (13%), bradycardia (7%), injection discomfort (7%), hypoxia (5%), and respiratory depression (1%). The majority of problems occurred during the first five minutes following induction (59%). BMI (p=0.001), premedication (p=0.041), and the time of complication onset (p=0.001) all had statistically significant relationships with the risk of complications, but age (p=0.269), gender (p=0.450), ASA status (p=0.066), and comorbidities (p=0.245) did not. Eighty-six percent of patients recovered on schedule after receiving appropriate therapies. According to the data, hypotension is the most common consequence after propofol induction, especially in obese individuals and those using antihypertensive medicines. Close hemodynamic monitoring and rapid treatment during the first few minutes after induction are critical for minimizing adverse events and improving perioperative patient safety.

INTRODUCTION

Propofol (2,6-diisopropylphenol) is a short-acting intravenous hypnotic anesthetic agent that is extensively used for the induction and maintenance of general anesthesia as well as for procedural and intensive care unit (ICU) sedation. It has become the preferred intravenous anesthetic because of its rapid onset of action,

short duration, and predictable recovery profile1,2. Propofol was first synthesized by Imperial Chemical Industries in 1977 and was introduced into clinical practice in Europe in 1986 before receiving approval in the United States in 19895. Since then, it has become one of the most frequently administered anesthetic agents worldwide owing to its favorable pharmacological properties and excellent patient recovery characteristics2.

The rapid onset of propofol occurs within approximately 30 seconds following intravenous administration because of its high lipid solubility, allowing rapid penetration across the blood-brain barrier9. The duration of hypnosis after a single induction dose is usually between 3 and 10 minutes due to rapid redistribution from the central nervous system to peripheral tissues rather than drug elimination3,4. This rapid recovery allows early neurological assessment, reduced postoperative sedation, and faster discharge from the recovery room, making propofol particularly suitable for ambulatory and day-care surgical procedures5.Propofol primarily exerts its anesthetic effect through potentiation of gamma-aminobutyric acid type A (GABA-A) receptors within the central nervous system7. It acts as a positive allosteric modulator of GABA-A receptors, increasing chloride ion conductance into neurons and producing membrane hyperpolarization, thereby suppressing neuronal excitability and inducing hypnosis, sedation, and unconsciousness11. This mechanism also contributes to its anticonvulsant, anxiolytic, and muscle-relaxant properties, making it highly effective for anesthesia induction and procedural sedation7.

Pharmacokinetically, propofol demonstrates rapid distribution, extensive plasma protein binding, and efficient metabolism. Approximately 95–98% of circulating propofol is bound to plasma proteins, while metabolism occurs predominantly in the liver through glucuronidation and hydroxylation pathways3. Nearly 40% of its metabolism also occurs through extrahepatic mechanisms, contributing to its high total body clearance6. Less than 0.3% of the administered dose is excreted unchanged in urine, indicating extensive metabolic transformation before elimination5.Because of its pharmacokinetic characteristics, propofol produces smooth induction of anesthesia with rapid emergence and minimal postoperative drowsiness In comparison with many other intravenous induction agents, propofol is associated with a lower incidence of postoperative nausea and vomiting (PONV), resulting in greater patient comfort, earlier oral intake, and shorter hospital stay8. These advantages have made propofol the induction agent of choice in modern anesthetic practice for both inpatient and outpatient surgical procedures2,5.

Despite these advantages, propofol administration is associated with several adverse effects that may occur during induction of anesthesia. The most frequently reported complications include hypotension, bradycardia, respiratory depression, apnea, pain during injection, and, less commonly, allergic reactions and metabolic abnormalities during prolonged infusion. Cardiovascular depression is primarily attributed to systemic vasodilation, reduced sympathetic nervous system activity, and decreased myocardial contractility, all of which contribute to reductions in blood pressure and cardiac output immediately after induction. Respiratory complications remain another important concern during propofol induction. The drug may cause transient apnea, airway obstruction, hypoventilation, and oxygen desaturation, particularly when administered rapidly or in combination with opioid analgesics. [1,4] Appropriate airway management, oxygen supplementation, and close monitoring are therefore essential during induction to prevent serious respiratory complications4.Pain during propofol injection represents one of the most common undesirable effects experienced by patients. The incidence of injection pain has been reported to range between 28% and 90%, depending upon the injection site, vein size, propofol formulation, and preventive measures employed. Various techniques including pretreatment with lidocaine, administration through larger veins, and slowing the injection

rate have been shown to reduce the severity of injection pain10.

The occurrence of propofol-related complications is influenced by several patient- and procedure-related factors. Advanced age, female gender, higher American Society of Anesthesiologists (ASA) physical status, cardiovascular disease, diabetes mellitus, hypovolemia, obesity, and concurrent administration of sedatives or opioids significantly increase the risk of perioperative complications10. Likewise, the total dose of propofol, injection speed, and duration of administration also influence the incidence and severity of adverse events6.Although propofol remains the gold standard intravenous induction agent because of its excellent anesthetic profile, complications occurring immediately after induction may contribute to increased perioperative morbidity if not recognized and managed promptly11.

Early identification of these complications allows timely intervention, improves hemodynamic stability, enhances patient safety, and reduces anesthesia-related adverse outcomes.Several international studies have reported varying incidences of hypotension, bradycardia, respiratory depression, and injection pain following propofol induction; however, these incidences differ according to patient characteristics, anesthetic techniques, and institutional protocols8.

Local data regarding the incidence of these complications remain limited, particularly among patients undergoing elective surgical procedures in Pakistan. Therefore, evaluating the frequency of complications associated with propofol induction is essential for improving anesthetic practice and developing strategies to minimize perioperative risks2.Therefore, the present study was designed to determine the incidence of complications following propofol induction of anesthesia in patients. The findings of this study may contribute to improved perioperative monitoring, evidence-based anesthetic management, and enhanced patient safety by identifying the most common complications associated with propofol induction5

METHODOLOGY:

This prospective observational study was conducted at the Operation Theatre of District Headquarters (DHQ) Hospital, Haripur, from March to July 2026. A total of 100 patients aged 18–90 years undergoing anesthesia induction with propofol were enrolled using convenience sampling. Data were collected using a modified pre-designed proforma, and patients were monitored for 10 minutes following induction to record any complications. Patients with propofol allergy, those not induced with propofol, and those with incomplete data were excluded. Ethical authorization was acquired prior to the trial. Data were analyzed using SPSS version 32.0 and Microsoft Excel 2024, employing descriptive statistics, cross-tabulations, and the Chi-square test, with a p-value <0.05 considered statistically significant.

RESULTS:

COMPREHENSIVE STATISTICAL ANALYSIS

The comparison of complications occurred with age of Patient, gender, BMI, ASA, Comorbidities, pre-medications, Propofol dose given, time of Complications occurrence, Management given, patients' outcome, and Procedure done using cross-tabulation with a Chi-square test.

Variable	Values	Key Finding							P-value
		Nil	Hypotension	HR↓	O2↓	HR↑	INJ-Pain	HTN	
Age of Patients	≤18 years	3	1	0	0	2	0	0	0.269
	18-40 years	17	16	1	1	5	0	9	
	41-64 years	8	18	2	4	5	0	9	
	≥65 years	0	1	0	0	0	0	1	
Gender	Male	10	6	1	1	4	2	4	0.450
	Female	18	30	2	4	8	1	9	
BMI	Below Normal	0	0	0	0	0	2	0	0.001
	Normal	25	23	2	3	8	1	10	
	Overweight	3	1	1	0	2	0	0	
	Obese	0	12	0	2	2	0	3	
ASA	I	16	14	0	0	5	3	2	0.066
	II	10	19	2	4	4	0	8	
	III	2	3	1	1	3	0	3	
Co-morbidities	None	20	21	1	2	7	3	5	0.245
	HTN	3	6	1	2	0	0	6	
	DM	1	3	0	1	0	0	1	
	Cardiac Diseases	1	1	1	0	3	0	1	
	Overweight	1	4	0	0	1	0	0	
	Asthma	2	1	0	0	1	0	0	
	Fatty Liver Disease	0	0	0	0	1	0	0	
Pre-medication	None	24	27	1	2	8	3	6	0.041
	Opioids	1	0	1	0	2	0	0	
	Anti-HTN	2	6	1	2	1	0	6	
	Anti-DM	0	3	0	1	0	0	1	
	Other	1	0	0	0	1	0	0	
Propofol Dose given	Low	1	0	0	0	0	1	0	0.039
	Standard	26	31	2	4	9	2	11	
	High	1	5	1	1	3	0	2	
Complications: time of occurrence	None	24	0	0	0	0	0	0	0.001
	Within 5 minutes	4	27	2	4	9	3	10	
	After 5 minutes	0	7	1	0	3	0	3	
	After 10 minutes	0	2	0	1	0	0	0	
Management given	None	24	1	1	1	1	3	2	0.001
	Fluids	0	29	0	0	4	0	0	
	Vasopressor	2	6	0	0	1	0	4	
	Atropine	1	0	2	0	2	0	0	
	Beta blocker	0	0	0	0	3	0	6	

	Corticosteroid	0	0	0	0	1	0	0	
	Mask O2	1	0	0	4	0	0	0	
Outcomes of patients	Recovered Timely	27	33	1	1	12	3	9	0.001
	Recovered Late	1	3	2	4	0	0	4	
Procedure done	Open cholecystectomy	6	19	1	2	5	0	5	0.001
	Laparoscopic cholecystectomy	8	8	0	2	3	0	5	
	Appendectomy	5	2	1	0	2	1	1	
	Thyroidectomy	2	0	1	0	0	0	1	
	Hernia repair	1	2	0	0	0	0	0	
	Exploratory laparotomy	3	0	0	0	1	0	0	
	Hypospadias surgery	2	0	0	0	1	0	0	
	TAH	0	5	0	1	0	0	1	
	Biopsy	1	0	0	0	0	2	0	

HR↓= Bradycardia; O2↓= Hypoxia; HR↑= Tachycardia; INJ-Pain= Injection Pain; HTN= Hypertension

This research comprised a total of 100 patients. The majority of participants (46.0%) were between the ages of 18 and 40, 41 and 64, respectively, with just 6.0% being younger than 18 and 2.0% older than 65. Females made up the bulk of the study population (72.0%). The majority of patients had a normal BMI (72.0%), followed by obese (19.0%), overweight (7.0%), and underweight (2.0%) persons. Regarding ASA categorization, 47.0% of patients were ASA II, 40.0% ASA I, and 13.0% ASA III. The most frequent comorbidity was hypertension (18.0%), with 59.0% of individuals having no underlying medical problems. The majority of patients (71%) did not get premedication, and 85.0% received the normal dose of propofol. The most common problem seen after propofol induction was hypotension (36.0%), followed by hypertension (13.0%), tachycardia (12.0%), hypoxia (5.0%), bradycardia (3.0%), injection discomfort (3.0%), and respiratory depression (1.0%). In 27.0% of cases, no problems were detected. The majority of problems (59.0%) occurred during the first five minutes following induction. Intravenous fluids, vasopressors, atropine, oxygen supplementation, and beta-blockers were the most often used treatments, with one-third of patients not requiring any intervention. The vast majority of patients (86.0%) healed without delay.

Cross-tabulation and Chi-square analysis found that age, gender, ASA status, and comorbidities had no significant relationship with propofol-related problems. However, BMI indicated a significant correlation ($p = 0.001$), with obese individuals having greater rates of hypotension and hypoxia. Premedication usage was also substantially related to problems ($p = 0.041$), especially among individuals using antihypertensive drugs. Furthermore, propofol dose ($p = 0.039$), problem onset time ($p = 0.001$), treatment offered ($p = 0.001$), patient outcomes ($p = 0.001$), and surgical operation type ($p = 0.001$) all had a significant relationship with the occurrence of difficulties. Hypotension was more prevalent in patients getting greater propofol dosages, as well as during open and laparoscopic cholecystectomy operations. Overall, the results show that while propofol is typically safe and effective, BMI, premedication state, propofol dose, and the early post-induction period all play major roles in the development of problems.

DISCUSSION:

The current study assessed the frequency of

problems following propofol induction for general anesthesia and identified risk variables for these issues. The most common consequence seen was hypotension (36%), followed by hypertension (13%), tachycardia (12%), hypoxia (5%), bradycardia (3%), injection discomfort (3%), and respiratory depression (1%). Most difficulties occurred during the first five minutes of induction and were successfully handled with proper measures. The majority of patients recovered quickly, demonstrating that propofol is still a safe anesthetic drug when administered with proper monitoring.

Short et al. recognized propofol as a safe and dependable intravenous anesthetic with easy induction, short recovery, and good anesthetic conditions. They also stated that the most common dosage-dependent side effects include hypotension and respiratory depression, which may be reduced with cautious dose titration, hydration treatment, oxygen supplementation, and ventilatory support as needed. These findings are consistent with the current study, in which hypotension was the most prevalent consequence and intravenous fluids were the major treatment technique12. Singh et al. examined Propofol-Related Infusion Syndrome (PRIS) and found that prolonged or high-dose propofol infusion might cause serious consequences such as metabolic acidosis, cardiac dysfunction, rhabdomyolysis, acute renal damage, and cardiac arrhythmias. Although PRIS was not observed in the current investigation since only propofol induction doses were delivered, the review underlines the significance of close monitoring and adequate dosage to avoid significant consequences13. Kotani et al. did a systematic review and meta-analysis of 30,757 patients and found that propofol had an acceptable safety profile in a variety of surgical and intensive care settings. Their findings corroborate the findings of the current investigation, in which the majority of problems were minor, efficiently handled, and followed by positive patient outcomes with fast recovery14. Kalmar et al. found that propofol-based total intravenous anesthesia (TIVA) had a significantly lower environmental impact than volatile anesthetic drugs while still providing great clinical efficacy. Although the current study did not assess environmental sustainability, the findings justify the ongoing use of propofol due to its excellent clinical and environmental characteristics15.

Cao et al. found that propofol-based anesthesia considerably decreased the incidence of postoperative delirium in elderly patients undergoing major cancer surgery compared to sevoflurane. Although postoperative delirium was not investigated in this study, the majority of patients recovered quickly, which is consistent with the authors' reported propofol recovery characteristics16.

Gao et al. tested ciprofol and propofol during colonoscopy and discovered that both drugs had comparable procedural success rates. However, ciprofol was linked to a considerably decreased incidence of injection discomfort, hypotension, and respiratory depression. In contrast, the current study indicated that hypotension was the most prevalent consequence following propofol induction, with injection discomfort and respiratory depression occurring less frequently, indicating that ciprofol may be more tolerable than propofol17. Hudaib et al. performed a systematic review and meta-analysis comparing ciprofol and propofol and concluded that both anesthetic agents provide comparable efficacy and recovery profiles. Ciprofol, on the other hand, was linked to less injection pain and better patient comfort, whereas propofol resulted in a slightly faster induction. These findings are consistent with the current study, which found that while injection discomfort was infrequent, hypotension remained the most prevalent consequence of propofol administration18.

The current study also found that BMI, premedication use, propofol dose, timing of complications, management provided, patient outcome, and surgical procedure type all had a significant impact on the occurrence of propofol-related complications. In contrast, age, gender, ASA status, and comorbidities had no significant association with problems. These findings highlight the importance of individualized patient assessment, careful dose selection, and vigilant monitoring during the early post-

induction period to minimize adverse events and improve patient safety.

CONCLUSION:

The current study suggests that propofol is an effective intravenous anesthetic drug for inducing general anesthesia, resulting in a smooth induction and adequate recovery in most patients. However, it is linked with a number of problems, the most prevalent of which is hypotension, especially in the first few minutes following injection. Complications were significantly associated with BMI, premedication status, time of onset, and patient outcomes, but not with age, gender, ASA status, or comorbidities. Overall, propofol has a generally acceptable safety profile when used properly; nevertheless, careful patient evaluation, tailored dose, and diligent intraoperative supervision are required to minimize side effects and maintain patient safety.

REFERENCES:

Singh A, Anjankar AP, Anjankar A. Propofol-related infusion syndrome: a clinical review. Cureus. 2022 Oct 17;14(10).

Zaccheo MM, Bucher DH. Propofol infusion syndrome: a rare complication with potentially fatal results. Critical Care Nurse. 2008 Jun 1;28(3):18-25.

Vanlersberghe C, Camu F. Propofol. Modern Anesthetics. 2008 Jan 1:227-52.

Lundström S, Twycross R, Mihalyo M, and Wilcock A Propofol. Journal of pain and symptom management. 2010 Sep 1;40(3):466-70.

Sahinovic MM, Struys MM, Absalom AR. Clinical Pharmacokinetics and Pharmacodynamics of Propofol: MM Sahinovic et al. Clinical pharmacokinetics. 2018 Dec;57(12):1539-58.

ABBAS, A., HASNAIN, J., ASJED, S., MUHAMMAD, R., GOHAR, G., MUHAMMAD, T. L., & NAEEMA, A. (2025). Comparative Study of Open and Laparoscopic Appendectomy with Complications in Government and Private Sector Hospitals. JOURNAL OF MEDICAL & HEALTH SCIENCES REVIEW Учредители: Asian Academy of Business and Social Science Research, 2(1).

Bryson HM, Fulton BR, Faulds D. Propofol: an update on its application in anesthesia and conscious sedation. Drugs. 1995 Sep;50(3):513-59.

Chen ZW, Chintala SM, Bracamontes J, Sugasawa Y, Pierce SR, Varga BR, Smith EH, Edge CJ, Franks NP, Cheng WW, Akk G. Three types of propofol binding sites on GABAA receptors. Journal of Biological Chemistry. 2024 Oct 1;300(10):107778.

Abdi A, Imani B, Zarei M, Abdolmaleki S, Zandi S, Vosough RN. The impact of isoflurane vs propofol-based complete intravenous anesthetic on hemodynamic stability, intraoperative blood loss, surgical field quality, recovery characteristics, and complications in patients having posterior lumbar fusion surgery: a randomized clinical trial. BMC anesthesiology. 2025 Jul 30;25(1):373.

Moukafih B, El Marrakchi S, Bennani I, Lakhdar-Idrissi M, Hida M, El Kartouti A, Achour S. Complications infectieuses liées à l'utilisation du propofol: une nouvelle série de cas et revue de la littérature. Therapies. 2023 Jul 1;78(4):375-83.

Bryson HM, Fulton BR, Faulds D. Propofol: An update on its usage in anesthesia and conscious sedation. Drugs. 1995 Sep;50(3):513-59.

Folino TB, Muco E, Safadi AO, Parks LJ. Propofol. InStatPearls [Internet] 2023 Jul 24. StatPearls Publishing.

Short CE, Bufalari A. Propofol anesthesia. Veterinary clinics of North America: Small animal practice. 1999 May 1;29(3):747-78.

Singh A, Anjankar AP, Anjankar A. Propofol-related infusion syndrome: a clinical review. Cureus. 2022 Oct 17;14(10).

Saleem, M.U.S., Ali, H.A.M., Jahangir, A. and Latif, M.T., ASSESSING THE knowledge attitude, practice and clinical screeningabout needle stick injury in operation theatre workers at tertiary care hospital.

Kotani Y, Pruna A, Turi S, Borghi G, Lee TC, Zangrillo A, Landoni G, Pasin L. Propofol and survival: an updated meta-analysis of randomized clinical trials. Critical Care. 2023 Apr 12;27(1):139.

Kalmar AF, Rex S, Groffen T, Vereecke H, Teunkens A, Dewinter G, Mulier H, Struys

MM. Environmental impact of propofol: a critical review of ecotoxicity and greenhouse effects. Best Practice & Research Clinical Anaesthesiology. 2024 Dec 1;38(4):332-41.

Cao SJ, Zhang Y, Zhang YX, Zhao W, Pan LH, Sun XD, Jia Z, Ouyang W, Ye QS, Zhang FX, Guo YQ. Delirium in elderly patients given propofol or sevoflurane anesthesia for major cancer surgery: a multicenter randomized study. British journal of anaesthesia. 2023 Aug 1;131(2):253-65.

Gao SH, Tang QQ, Wang CM, Guan ZY, Wang LL, Zhang J, Yan ZL. The efficacy and safety of ciprofol and propofol in patients undergoing colonoscopy: a double-blind, randomized, controlled trial. Journal of clinical anesthesia. 2024 Aug 1;95:111474.

Hudaib M, Malik H, Zakir SJ, Rabbani S, Gnanendran D, Syed AR, Suri NF, Khan J, Iqbal A, Hussain N, Abdullah M. A comprehensive review and meta-analysis comparing the efficacy and safety of ciprofol with propofol for general anesthesia induction and maintenance. Anesthesia, Analgesia, and Critical Care Journal. 2024 Apr 11;4(1):25.