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# COMPARATIVE ANALYSIS OF PROPOFOL AND PROPOFOL WITH KETAMINE IN AMBULATORY ANESTHESIA PATIENTS: A PROSPECTIVE STUDY

*[1]Divyansh Gaur, [1]Ali Raza, [2]Sachin Kumar Gupta, [2]Shah Raj Jayantilal, [2]Shrikanta**
*[1]Secondary DNB, Department of Anaesthesiology, Deen Dayal Upadhyay Hospital, India*
*[2]Senior Resident, Department of Anaesthesiology, Deen Dayal Upadhyay Hospital, India*



## Abstract

### Background

The barbiturate class of sedatives and anesthetics has a prolonged half-life. Ambulatory admittance is used for minor procedures like endoscopies that are performed on outpatients. After the surgery is over, the patients can be released from the anesthetic's effects.

### Objectives

The goal of this research was to compare total intravenous anesthesia in ambulatory anesthesia using propofol alone versus propofol plus ketamine.

### Materials and methods

The study was designed as a prospective study that took place at the Department of Anesthesia, Deen Dayal Upadhyaya Hospital, Delhi, India. The study was conducted for six months. In all, sixty people were invited to participate in the study.

### Results

The induction dosage in both the groups of participants were 2.01±0.13 and 1.58±0.4 respectively in the patient groups that received propofol and propofol plus ketamine. Time to recover from induction dose was found to be highly significant.

### Conclusion

According to this study, propofol and ketamine together provide better hemodynamic stability when compared to propofol since they require less induction and have fewer side effects. Additionally, the duration of pain alleviation following surgery was greater.

### Recommendations

For ambulatory anesthesia, propofol, and ketamine together provide an effective anesthetic with a lower risk of adverse medication reactions; hence, it should be chosen over propofol alone.

***Keywords:*** *Sedation, Propofol, Ketamine, Total intravenous anesthesia, Ambulatory*
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***Corresponding Author:*** *Shrikanta*
***Email:*** *drshrikantab@gmail.com*
*Senior Resident, Department of Anaesthesiology, Deen Dayal Upadhyay Hospital, India.*

## Introduction

Barbiturate-class sedatives and anesthetics act for a longer period. Endoscopies and other minor operations performed on outpatients are considered ambulatory admissions. The patients should be free of the anesthetic's effects and able to leave after the surgery. The quick elimination of ambulatory anesthetics from the body is their main necessity [1].

Although barbiturates are not the only anesthetics that can effectively produce the necessary anesthesia, many of them have aftereffects like lightheadedness and dizziness. One intravenous anesthetic that produces anesthesia without any aftereffects is propofol. Propofol is readily extracted from blood serum due to its pharmacokinetics. An effective anesthetic is propofol. Propofol has the drawback of causing negative medication responses. Propofol's adverse medication reactions are linked to the cardiovascular and respiratory systems. There have been reports of bradycardia, respiratory depression, and in some cases, apnea following propofol anesthesia [2]. Propofol does not have long-lasting analgesia, but it does induce enough anesthesia. The literature has documented several propofol adjuvants, including ketamine [3, 4].

Total intravenous anesthesia (TIVA) is a technique that avoids the use of nitrous oxide and volatile agents by using intravenous medications alone to induce and maintain unconsciousness. Ketamine, a derivative of phencyclidine,

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is known to cause amnesia and analgesia. It does not result in cardiac depression but rather mild respiratory depression. However, emergence reactions—which are linked to delirium, delusions, and dreaming—occur when ketamine is taken as the only medication for procedural sedation and analgesia. Laryngospasm and airway blockage have also been observed in a small number of cases [5, 6].

In the past, attempts have been made to lower the dosage of propofol by using additives with it. In one trial, midazolam and propofol together improved amnesia during outpatient procedures and decreased the dosage of propofol [7]. Additionally, it has been demonstrated that, even at lower levels of sedation than propofol, propofol with fentanyl during colonoscopies produced comparable patient satisfaction and quicker recovery times [8].

This study was done to compare TIVA in ambulatory anesthesia using propofol alone versus propofol plus ketamine.

## Methodology

### Study Design

The study was designed as a prospective study that took place at the Department of Anesthesia, Deen Dayal Upadhyaya Hospital, Delhi, India. The study was conducted for six months.

### Patient Population

In all, sixty people were invited to participate in the study. The participants had to be in ASA grades I and II, between the ages of 20 and 40, and scheduled for ambulatory anesthesia, which includes closed reduction of upper limb fractures and incision and drainage of abscesses. Among all 60 participants, two groups each consisting of 30 patients were prepared, one receiving propofol only (Group A) and the other receiving propofol along with ketamine (Group B). Uncooperative participants and those with a history of medication allergies were not allowed to participate in the study.

### Data Collection

Before the study started, the participating subjects gave their signed and informed consent. Hemodynamics, intraoperative, propofol, and ketamine induction requirements, recovery time from induction, postoperative complications, and length of pain relief after surgery were among the data that were documented.

### Study Procedure

Before being put under anesthesia, all patients were required to fast for at least six hours. Before the operation, measurements were made of SpO2, respiration rate (RR), and blood pressure (BP). Following the secure attachment of the 18 G cannula and the connection of the electrocardiogram (ECG) monitor, oximeter for measurement of pulse, and NIBP, the patients were prepped with a 0.2 mg dose of glycopyrrolate 15 to 20 minutes before induction. Along with an oxygen delivery system, emergency resuscitation supplies, and emergency medications, the anesthesia machine was maintained on hand.

Subsequently, the anesthesia was maintained with a 10 mg intravenous propofol bolus in the propofol group and a 10+10 mg intravenous propofol ketamine bolus based on the following criteria: tachycardia, increased blood pressure, an increase in RR, spontaneous moments, and the formation of tears in the propofol ketamine group.

Bain's circuit and a mask were used to maintain spontaneous respiration at 100% oxygen.

BP, ECG changes, RR, basal pulse rate, and saturation were recorded every five minutes until the surgery was finished. The length of pain alleviation following surgery was also recorded. Ondansetron 100–150 micrograms per kilogram IV was administered as an injection to treat nausea and vomiting. The first analgesic demand time was recorded. To relieve the patient's pain, the standard analgesics were given for the next twenty-four hours.

### Statistical Analysis

The data was collected in Microsoft Excel, and statistical software SPSS version 20 was used for the analysis. The statistical significance of the paired data was evaluated using the Student t-test. A p-value less than 0.05 was considered to be significant.

### Ethical Considerations

Informed consent was taken from participants.

## Results

Tables 1, 2, 3, 4, and 5 represent intergroup comparisons of parameters such as systolic and diastolic blood pressure, pulse rates, respiratory rates, and oxygen saturation at various time intervals. Table 6 represents changes in characteristics such as induction dose, time of recovery from induction dose, and time for first analgesic demand.

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**Table 1. Comparison of variations in systolic blood pressure between groups**

| Mean Systolic BP | Group A (n=30) | Group B (n=30) | P - Value |
|---|---|---|---|
| At 0 MIN | 117.6±9.82 | 116.8±7.89 | >0.05 |
| At 5 MIN | 97.2±76.3 | 121.4±7.94 | <0.001 |
| At 10 MIN | 98.1±5.56 | 123.4±7.24 | <0.001 |
| At 15 MIN | 102.6±6.02 | 118.19±8.69 | <0.001 |
| At 20 MIN | 107.6±4.54 | 122.5±8.63 | <0.001 |
| At 25 MIN | 109.2±4.39 | 122.1±8.15 | <0.001 |
| At 30 MIN | 111.1±6.25 | 123.4±7.81 | <0.001 |

*The data were shown as mean±SD.*
*The P-value was considered significant at <0.05*

**Table 2: Comparison of variations in diastolic blood pressure between groups**

| Mean Diastolic BP | Group A (n=30) | Group B (n=30) | P-Value |
|---|---|---|---|
| At 0 MIN | 74.3±5.89 | 73.1±5.6 | >0.05 |
| At 5 MIN | 61.7±3.12 | 73.9±5.8 | <0.001 |
| At10 MIN | 64.1±4.01 | 71.9±5.4 | <0.001 |
| At15 MIN | 64.5±3.68 | 72.1±6.4 | <0.001 |
| At20 MIN | 71.6±4.08 | 72.9.9±5.8 | >0.05 |
| At25 MIN | 68.7±4.46 | 71.5±7.3 | <0.001 |
| At30 MIN | 69.2±5.76 | 74.6±7.9 | <0.001 |

*The data were shown as mean±SD.*
*The P-value was considered significant at <0.05*

**Table 3: Comparison of variations in mean pulse rate pressure between groups**

| Mean Pulse Rate | Group A (n=30) | Group B (n=30) | P-Value |
|---|---|---|---|
| At 0 MIN | 76.3±5.46 | 76.6±6.78 | >0.05 |
| At 5 MIN | 72.9±4.54 | 76.6±4.99 | <0.001 |
| At10 MIN | 76.2±4.67 | 76.5±7.1 | <0.001 |
| At15 MIN | 74.3±6.32 | 77.9±6.73 | <0.001 |
| At20 MIN | 72.3±5.67 | 78.4±4.29 | <0.001 |
| At25 MIN | 75.7±5.24 | 78.0±5.04 | <0.001 |
| At30 MIN | 76.1±3.34 | 76.6±6.49 | <0.001 |

*The data were shown as mean±SD.*
*The P-value was considered significant at <0.05*

**Table 4. Comparison of variations in oxygen saturation between groups**

| Mean Oxygen Saturation | Group A (n=30) | Group B (n=30) | P-Value |
|---|---|---|---|
| At 0 MIN | 99.5±0.67 | 98.8±0.54 | >0.05 |
| At 5 MIN | 99.6±0.81 | 98.6±1.52 | <0.001 |
| At10 MIN | 99.4±0.61 | 99.6±0.57 | >0.05 |
| At15 MIN | 99.7±0.61 | 99.4±0.51 | >0.05 |
| At20 MIN | 99.3±0.53 | 99.6±0.71 | >0.05 |
| At25 MIN | 101±0.53 | 99.7±0.73 | >0.05 |
| At30 MIN | 99.85±0.67 | 99.7±0.70 | >0.05 |

*The data were shown as mean±SD*
*The P-value was considered significant at <0.05*

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**Table 5. Comparison of variations in mean respiratory rate between groups**

| Mean Respiratory Rate | Group A (n=30) | Group B (n=30) | P-Value |
|---|---|---|---|
| At 0 MIN | 17.1±1.56 | 16.54±2.6 | >0.05 |
| At 5 MIN | 17.35±1.56 | 16.45±1.54 | <0.001 |
| At10 MIN | 17.7±1.56 | 16.65±2.19 | <0.001 |
| At15 MIN | 17.45±1.76 | 17.6±1.41 | <0.001 |
| At20 MIN | 17.15±1.87 | 15.7±1.68 | >0.05 |
| At25 MIN | 17.5±1.56 | 15.7±1.48 | >0.05 |
| At30 MIN | 17.2±1.09 | 17.6±1.43 | >0.05 |

*The data were shown as mean±SD.*
*The P-value was considered significant at <0.05*

**Table 6. Changes in patients after dosage**

| Characteristics | Group A (n=30) | Group B (n=30) | P-Value |
|---|---|---|---|
| **Induction dose (mg/kg)** | 2.01±0.13 | 1.58±0.4 | <0.001 |
| **Time of recovery from induction dose** | 1.98 | 8.7 | <0.001 |
| **Time for first analgesic demand (in minutes)** | 9.7±2.69 | 49.8±6.78 | - |

*Data were presented as either mean±SD or n*
*The P-value was considered significant at <0.05*

## Discussion

When used at subanesthesia doses, ketamine lowers the amount of propofol needed for induction. We call this co-induction. It offers stability in hemodynamics. Additionally, in 2001, Saga K et al. found that the dose of induction of propofol along with ketamine was decreased when compared to fentanyl [6].

In this study, a dose of induction of propofol was similar to what Briggs P et al. and colleagues found, according to our research. Additionally, the mean dose of induction propofol in the propofol-ketamine group was statistically significant [2].

In surgical rabbits, Cruz FS et al in 2010 assessed TIVA with propofol alone or in combination with ketamine and discovered that ketamine enhances heart rate control and propofol-induced anesthesia [9].

Comparing the propofol group to the propofol ketamine combination group, this study also found that the propofol group showed a reduction in the average heart rate and BP.

Mortero RF et al. found in 2001 that co-administration of a short dose of ketamine reduces hypoventilation caused by propofol, has a good effect on mood without altering perceptions following surgery, and may hasten cognitive recovery. However, neither apnea nor hypoventilation was present [10].

Sedation, behavior, discomfort, and the degree of emerging delirium were all examined by Rizk SN et al. in 2013. Emergence delirium was similar in the ketofol and propofol groups, but it was substantially more common in the control group [11].

## Conclusion

This study demonstrates that the propofol ketamine combination offers superior hemodynamic stability when compared to propofol due to lower propofol induction requirements, fewer adverse effects, and a longer duration of pain relief following surgery. The propofol ketamine group took longer to recover from the induction dose.

## Limitations

The effects of dose modification were not assessed in this investigation. Additionally, there was no post-operative hemodynamic recording.

## Recommendations

For ambulatory anesthesia, propofol and ketamine together provide an effective anesthetic with a lower risk of adverse medication reactions; hence, it should be chosen over propofol alone.

## Acknowledgment

We are thankful to the patients; without them, the study could not have been done. We are thankful to the supporting staff of our hospital who were involved in the patient care of the study group.

## Data Availability

Data is available upon request.

## Author contributions

All authors contributed to the design of the research. S, DG, and SRJ collected and analyzed the data. AR and SKG wrote the manuscript. DG and S edited the paper. All authors read and approved the paper.

## List of abbreviations

TIVA- Total intravenous anesthesia
RR- Respiration rate
BP- Blood pressure
ECG- Electrocardiogram
NIBP- Non-Invasive Blood Pressure

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No funding was received.

## Conflict of interest

The authors have no conflicting interests to declare.

## References

1. Das SK, Rajsamant NK, Thatei C, Jena S. COMPARING CLINICAL EFFICACY OF PROPOFOL KETAMINE COMBINATION VERSUS PROPOFOL ALONE IN AMBULATORY ANAESTHESIA: AN OBSERVATIONAL COMPARATIVE STUDY. Student's Journal of Health Research Africa. 2023 Dec 16;4(12):5-.
2. Briggs LP, Clarke RS, Dundee JW, Moore J, Bahar M, Wright PJ. Use of di-isopropyl phenol as the main agent for short procedures. British journal of anesthesia. 1981 Nov 1;53(11):1197-202. https://doi.org/10.1093/bja/53.11.1197
3. Goel S, Bhardwaj N, Jain K. Efficacy of ketamine and midazolam as co-induction agents with propofol for laryngeal mask insertion in children. Pediatric Anesthesia. 2008 Jul;18(7):628-34. https://doi.org/10.1111/j.1460-9592.2008.02563.x
4. Martinez-Taboada F, Leece EA. Comparison of propofol with ketofol, a propofol-ketamine admixture, for induction of anesthesia in healthy dogs. Veterinary anesthesia and analgesia. 2014 Nov 1;41(6):575-82. https://doi.org/10.1111/vaa.12171
5. Smita Bharti, Prashant, Ajay Kumar. A clinical study to compare the clinical efficacy of propofol alone with propofol ketamine combination during ambulatory anesthesia. Int. J. Heal. Clin. Res. [Internet]. 2021Nov.8 [cited 2024Dec.27];4(19):104-7.
6. Saha K, Saigopal M, Sundar R, Palniappan M, Mathew AC. Comparative evaluation of propofol-ketamine and propofol-fentanyl in minor surgery. Indian J Anaesth. 2001;45(2):100-3.
7. Reinhart DJ, Grum DR, Berry J, Lensch D, Marchbanks CR, Zsigmond E. Outpatient general anesthesia: a comparison of a combination of midazolam plus propofol and propofol alone. Journal of clinical anesthesia. 1997 Mar 1;9(2):130-7. https://doi.org/10.1016/S0952-8180(97)00237-7
8. VanNatta ME, Rex DK. Propofol alone titrated to Deep Sedation Versus Propofol in Combination with Opioids and/or Benzodiazepines and titrated to moderate sedation for Colonoscopy: CME. Official journal of the American College of Gastroenterology| ACG. 2006 Oct 1;101(10):2209-17. https://doi.org/10.1111/j.1572-0241.2006.00760.x
9. Cruz FS, Carregaro AB, Raiser AG, Zimmerman M, Lukarsewski R, Steffen RP. Total intravenous anesthesia with propofol and S (+)-ketamine in rabbits. Veterinary anesthesia and analgesia. 2010 Mar 1;37(2):116-22. https://doi.org/10.1111/j.1467-2995.2009.00513.x
10. Mortero RF, Clark LD, Tolan MM, Metz RJ, Tsueda K, Sheppard RA. The effects of small-dose ketamine on propofol sedation: respiration, postoperative mood, perception, cognition, and pain. Anesthesia & Analgesia. 2001 Jun 1;92(6):1465-9. https://doi.org/10.1097/00000539-200106000-00022
11. Rizk SN, Samir EM. Use of ketofol to control emergence agitation in children undergoing adenotonsillectomy. Egyptian Journal of Anaesthesia. 2014 Jan 1;30(1):13-9. https://doi.org/10.1016/j.egja.2013.09.003

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