

## Original Research Article

# Ketamine and propofol: safe for short procedures

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### ABSTRACT

**Background:** Patients who attend the hospital for any form of operative procedure frequently undergo physical or mental pain and agitation. These patients are extremely anxious. It is important to choose the most appropriate form of anesthesia for induction for the analgesia or sedation. This study examined the safety and effectiveness of the Ketamine and Propofol combination technique for short procedures like D and C, MTP, evacuation and marsupialisation of Bartholin's abscess.

**Methods:** The present observational study was carried out in association with the Gynecology and Obstetrics department and Department of Anesthesiology of PDMMC and hospital, Amravati, Maharashtra, India over a period of 3 months from 1<sup>st</sup> January to 31<sup>st</sup> March 2019.

**Results:** In present study, 28 (56%) patients were of 25-40 years age, 14 (28%) patients were of 41-50 years age while 8 (16%) patients were of 51-60 years age. 7 (14%) patients were underweight, 26 (52%) patients had normal BMI, 10 (20%) patients were overweight while 7 (14%) patients were obese. MAP before surgery was  $100 \pm 12$ , which decreased to  $92 \pm 9.2$  during operation and increased to  $97 \pm 19.4$  in the postoperative period. Heart rate and arterial SPO<sub>2</sub> were not significantly different before, during, and after the operation. Mean VAS score for pain was  $5.2 \pm 5.1$  and the mean Ramsay's score of sedation was  $5.8 \pm 0.01$ . 1 (2%) patient had apnea, 1 (2%) patient had skin reaction, 1 (2%) patient had cough, 1 (2%) patient had agitation while 2 (4%) patient had nausea and vomiting.

**Conclusions:** Ketamine and Propofol combination technique can be recommended for use in the short procedures safely and effectively.

**Keywords:** Efficacy, Midazolam propofol, Safety, Short procedures, Ketamine

### INTRODUCTION

Patients who attend the hospital for any form of operative procedure frequently undergo physical or mental pain and agitation. This causes significant tachycardia, hypertension, vasoconstriction, increase in oxygen consumption, blunting of immune response, and salt and water retention. Also, these patients are extremely anxious. It is important to choose the most appropriate

form of anesthesia for induction for the analgesia or sedation.<sup>1</sup>

The superiority of the drugs and the lack of potentially dangerous adverse reactions would decide the choice in the hospital setting. The main aim of sedation and analgesia is to give patients some relief from both pain and anxiety with minimal adverse events. The anesthesia should be effective in reducing the stress. It should

improve the patient compliance as well.<sup>2</sup> Ketamine is in clinical use since long time. It is a unique intravenous anesthetic. It produces many effects like sedation, catalepsy, somatic analgesia, bronchodilation, and sympathetic nervous system stimulation.<sup>3</sup>

Ketamine increases salivation and muscle tone. It has cataleptic, amnestic, profound analgesic, and anesthetic actions which are dose dependent. It produces dissociative state. It is unique in that the patient appears awake but is detached from the surroundings with eyes remaining open.<sup>4</sup>

The cataleptic state which is produced by Ketamine is an akinetic state with the loss of orthostatic reflexes, but it does not impair consciousness.<sup>5</sup>

Propofol is now the most commonly used induction agent for general anesthesia. It is used for total intravenous general anesthesia and sedation with increasing frequency. It is well tolerated. It is associated with fewer side effects after anesthesia than many of other general anesthetics. However, it has adverse effects like pain on injection, hypotension, hypoventilation, bradycardia, and hyperlipidemia.<sup>6</sup>

Propofol causes rapid and reliable loss of consciousness. The dose of Propofol which needs to induce general anesthesia in adults is normally between 1.5 and 2.5 mg/kg.<sup>7</sup>

In recent years, Propofol has become popular as it induces quick and deep induction. It has short effecting time period so can be used in case of emergency for sedation and analgesia.<sup>8</sup>

Propofol causes dose-dependent respiratory depression. It temporarily reduces blood pressure in some patients. Propofol is a strong anesthetic without analgesic effect so a quick action opioid like fentanyl is usually used for analgesic effect. Use of opioids with Propofol drug reduces the amount of dose, but it increases the respiratory depression.<sup>9</sup>

Fentanyl in combination with Propofol causes analgesic effect, quick recovery and less side effects.<sup>10</sup>

The objectives were to observe the adverse events in patients undergoing short procedures like D and C, MTP, evacuation and marsupialisation of Bartholin's abscess in Gynecology and Obstetrics department in association with the department of Anesthesiology as primary outcome. Secondary outcome was pain relief and effect of sedation.

## METHODS

The present observational study was carried out in 50 patients in association with the Gynecology and Obstetrics department and Department of Anesthesiology

of PDMMC and Hospital, Amravati, Maharashtra over a period of 3 months from 1st January to 31st March 2019. Verbal and written consent to participate in the study was taken from all patients.

### Inclusion criteria

- All adult patients of 25-60 years of age receiving Ketamine and Propofol combination technique for short procedures like D and C, MTP, evacuation and marsupialisation of Bartholin's abscess.
- All adult patients who were able to give verbal and written consent to participate in the study.
- All patients with physical status of ASA I and II.

### Exclusion criteria

- All adult patients of < 25 and >60 years of age receiving Ketamine and Propofol combination technique for long procedures
- All adult patients who were not able to give verbal and written consent to participate in the study.
- All patients with physical status of ASA III and IV.

Detailed explanations regarding the study and the drugs to be used were provided to all patients. The explanations given included the effects and the side effects of the drugs under study. Patients also received explanations about the procedure that would take place. Both verbal and written consents were obtained. Patients undergoing the procedure were pretreated with intravenous Fentanyl or Midazolam or Fortwin. Then patients receive intravenous Ketamine 0.5 mg/kg followed by intravenous Propofol 1 mg/kg. Dose of Propofol 0.5 mg/kg was repeated as needed to achieve and maintain sedation.

Standard monitoring in pre, intra and post-operative period of was carried out on each patient.

The outcome measurements were:

- Systolic and diastolic blood pressure
- Respiratory rate
- Heart rate
- Mean arterial pressure (MAP)
- Oxygen saturation (SPO<sub>2</sub>).

## RESULTS

In present study, 28 (56%) patients were of 25-40 years age, 14 (28%) patients were of 41-50 years age while 8 (16%) patients were of 51-60 years age (Table 1). So, majority of patients were of 25-40 years age.

In present study, 7 (14%) patients were underweight, 26 (52%) patients had normal BMI, 10 (20%) patients were overweight while 7 (14%) patients were obese (Table 1). So, majority of patients had normal BMI. In present study, MAP before surgery was 100±12, which decreased to 92±9.2 during operation and increased to 97±19.4 in

the postoperative period. Heart rate and arterial SPO<sub>2</sub> were not significantly different before, during, and after the operation (Table 2).

**Table 1: Age distribution and BMI.**

Age distribution	No. of patients	Percentage
25-40 years	28	56%
41-50 years	14	28%
51-60 years	8	16%
<b>BMI</b>		
<18 (Underweight)	7	14%
18-23 (Normal)	26	52%
23-25 (Overweight)	10	20%
>25 (Obese)	7	14%

So, patients were stable before, during, and after the operation.

**Table 2: Mean arterial pressure, heart rate and SpO<sub>2</sub>.**

Parameters	Pre-operative	Intra-operative	Post-operative
Mean arterial pressure	100±12	92±9.2	97±19.4
Heart rate	82±11.8	78±9.0	83±8.02
SpO <sub>2</sub>	98±0.30	97±0.40	99±0.23

In present study, the mean VAS score for pain was 5.2±5.1 and the mean Ramsay’s score of sedation of the patients was 5.8 ± 0.01. It showed that the pain score and sedation level of the patients were significantly lower (Table 3).

**Table 3: VAS score for pain and Ramsay’s score for sedation.**

Variables	Score
Pain VAS score	5.2±5.1
Sedation Ramsay’s score	5.8±0.01

In present study, out of 50 patients, 1 (2%) patient had apnea, 1 (2%) patient had skin reaction, 1 (2%) patient had cough, 1 (2%) patient had agitation while 2 (4%) patient had nausea and vomiting (Table 4). So, side effects in our study were very minimal.

**Table 4: Adverse reactions.**

Adverse reactions	No. of patients	Percentage
Apnea	1	2%
Skin reaction	1	2%
Cough	1	2%
Agitation	0	2%
Nausea and vomiting	2	4%

**DISCUSSION**

In present study, 28 (56%) patients were of 25-40 years age, 14 (28%) patients were of 41-50 years age while 8 (16%) patients were of 51-60 years age (Table 1). So, majority of patients were of 25-40 years age.

In present study, 7 (14%) patients were underweight, 26 (52%) patients had normal bmi, 10 (20%) patients were overweight while 7 (14%) patients were obese (Table 1).

Similar to our study, Nik Hisamuddin et al, found that 75.6% were males. The mean age was 37.8 years (95% ci 33.2, 39.8). Not a single patient developed any of the major complications under psa.<sup>11</sup>

In present study, map before surgery was 100 ± 12, which decreased to 92±9.2 during operation and increased to 97±19.4 in the postoperative period. Heart rate and arterial spo<sub>2</sub> were not significantly different before, during, and after the operation (Table 2).

Similar to our study, kb n et al found in a study performed on 60 candidates of puerperal sterilization that mixture of ketamine and propofol is safer and more healthy hemodynamically and respiratory depression, is less.<sup>12</sup>

Similar to our study, David H et al found that the incidence of respiratory depression was same in ketamine/propofol (21/97, 22%) and propofol-alone (27/96, 28%) groups, with difference of 6% (95% confidence interval -6% to 18%). With ketamine/propofol, treating physicians and nurses were more satisfied and less amount of propofol was required. Also, it gave better sedation.<sup>13</sup>

In present study, the mean vas score for pain was 5.2 ± 5.1 and the mean ramsay’s score of sedation of the patients was 5.8±0.01.

It showed that the pain score and sedation level of the patients were significantly lower (Table 3).

Similar to our study, shah a et al found that amongst 136 patients (67 ketamine/propofol, 69 ketamine), median total sedation time was shorter (p=0.04) with ketamine/propofol (13 minutes) than with ketamine (16 minutes) alone (δ -3 minutes; 95% confidence interval [ci] -5 to -2 minutes). Median recovery time was faster with ketamine/propofol (10 minutes) than with ketamine (12 minutes) alone (δ -2 minutes; 95% ci -4 to -1 minute). There was less ice of vomiting in the ketamine/propofol (2%) group. It was 12% with the ketamine group (δ -10%; 95% ci -18% to -2%). With ketamine/propofol, satisfaction was higher (p<0.05).<sup>14</sup>

In present study, out of 50 patients, 1 (2%) patient had apnea, 1 (2%) patient had skin reaction, 1 (2%) patient

had cough, 1 (2%) patient had agitation while 2 (4%) patient had nausea and vomiting (Table 4).

Contrary to our study, Gary A et al, found that out of 284 patients, 43 (30%) patients had an adverse respiratory event in the ketofol group compared with 46 (32%) in the propofol group (difference 2%; 95% confidence interval -9% to 13%;  $p=0.80$ ). 3 ketofol patients and 1 propofol patient needed ventilation to be given by bag and mask. 65 (46%) patients receiving ketofol and 93 (65%) patients receiving propofol required repeated doses. Some patients progressed to a Ramsay sedation score of 4 or less (difference 19%; 95% confidence interval 8% to 31%,  $p=.001$ ). 6 patients on ketofol experienced agitation. Satisfaction in patients and staff was equal with both agents.<sup>15</sup>

Contrary to our study, James RM et al in 271 patients found that airway or respiratory adverse events were similar between groups: 29%, 19%, and 32%, respectively ( $p=.21$ ). There were no serious adverse events in any group. Secondary outcomes were generally similar between groups. Agitation was more observed in the 1:1 ketofol group (8%, 21%, and 10%, respectively).<sup>16</sup>

Similar to our study, Nazemroaya B et al reported 4 (12.5%) cases of complication in the fenofol group. 2 (6.3%) cases had skin hives, 1 (3.1%) case had cough, and 1 (3.1%) case had dyspnea. In the ketofol group, 6 (18.7%) cases of complication were observed. 1 (3.1%) had skin hives, 1 (3.1%) had cough, and 4 (12.5%) had restlessness. No statistically significant difference between the two groups was observed ( $p < 0.05$ ).<sup>17</sup>

Similar to our study, Karki SB et al found patients comfortable with both the anesthetic agents. Onset of anesthesia was faster in group A. Intraoperative sedation was comparable. Recovery from sedation was good. Postoperatively, nausea vomiting, severe pain, ketamine induced psychotomimetic effects were seen. They were treated well and discharged on the same day.<sup>18</sup>

## CONCLUSION

Combination of Ketamine and Propofol proved to be safe and effective combination for short procedures. It resulted in great satisfaction, less Propofol administration, and good sedation quality.

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