Original Research Article

Comparative study of ketamine-propofol in two proportions for short gynecological procedures as sedation and analgesia

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Abstract

Background: Ketofol is most recently practicing procedural and sedation analgesia for the short duration surgical procedures. To assess and compare the two different ratios of intravenous propofol-ketamine combination in minor gynecological procedures with respect to adequate analgesia and sedation, hemodynamic stability, airway intervention, need for supplementation, duration of recovery, emergence phenomena and vomiting. **Method:** Ninety patients of ASA grade I and II posted for elective minor gynecological procedures were randomly allocated to two groups with 45 patients in each arm. Group A received propofol 2.0mg/kg and ketamine 1.0mg/kg and Group B received propofol 1.0mg/kg and ketamine 1.0mg/kg. Adequacy of sedation was analyzed using Ramsay sedation scale and hemodynamic parameters were recorded. **Results:** Higher Sedation score, more recovery time, less need for supplemental dose and less emergence phenomena were noted to be statistically significant in group A as compared to group B. A significant 10% higher hemodynamic parameters were noted in patients of group B as compared to patients of group A. **Conclusion:** Adequate analgesia and better hemodynamic parameters were seen in patients receiving ketofol(1:2) as compared to ketofol(1:1) for short gynecological procedures.

Keywords: ketamine, Propofol, Gynecological procedures

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INTRODUCTION

Patients attending the hospital for any surgical procedure would feel extremely anxious and so it is important to choose the most appropriate form of anesthesia for induction, analgesia, and sedation.[1] In anesthesia currently the usage of TIVA (total intravenous anesthesia) has been on a rise by using different type of drugs, making the patient more comfortable, and facilitates the surgeon in completing the surgical procedure without any anesthetic related complications as well as a rapid recovery at the end of the surgery.[2] The most recent procedural and sedation analgesia (PSA) combination to be described in the literature is that of low dose ketamine and propofol (Ketofol).[3,4] It is postulated that combining these two agents for PSA may preserve sedation efficacy while minimizing their respective adverse effects.[5,6] Most studies do attempt to evaluate safety as measured by respiratory and cardiovascular status , very few look at the frequency of other adverse events such as emergence reactions which , if present, may cause practitioners to veer away from ketofol and use an alternate regimen that is more familiar.

METHODS

Ninety patients posted for short gynecological procedures such as Dilatation and Curettage, polyp excision, fractional

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curettage and Bartholin's cyst excision were included in the study after getting the written consent of the patients and approval by the ethical committee of the institution. The study population includes women aged between 18 and 60 years of ASA I and II posted for short gynecological procedures. The entire study subjects were divided into 2 groups, each consisting of 45 patients.

Group A - Propofol 2.0mg/kg + Ketamine 1.0mg/kg

Group B - Propofol 1.0mg/kg + ketamine 1.0mg/kg

All the study participants received 10mcg/kg of glycopyrrolate and 20mcg/kg of midazolam as premedication drugs, and later they were given the calculated dose of the drug combination after a period of 1 minute as per their group allocation. Once the patient was under deep sedation, the vital parameters were measured every 5 minutes from the time of starting propofol and ketamine intravenous administration and the readings were recorded. Adequacy of sedation was analysed using Ramsay sedation scale. Score of 5 and above was considered as satisfactory and the surgeon was allowed to do the procedure. Time was noted from propofol and ketamine administration to attain a score of 4 or below on the Ramsay Sedation Scale - this was considered as inadequate level of anesthesia and incremental doses of propofol was administered as iv bolus. The effective duration of anesthesia and the amount of supplemental propofol required were recorded. The need for positive pressure ventilation and untoward events like vomiting and emergence phenomena were recorded carefully.

Statistical Method: Mean ± standard deviation(SD) was calculated for all the parametric variables and percentage was calculated for all the frequency variables. Statistical inference was derived by applying student T test (unpaired T test) for two continuous variables and chi-square test or Fisher's exact test for categorical variables. P value <0.05 is considered as as statistically significant. The data were analyzed using Statistical Package for the social Sciences (SPSS version 21)

RESULTS

Age wise distribution were similar in both groups and duration of all procedures were less than 30 minutes

Table 1: Age wise distribution

Age group	Group A	Group B	P value
20–30	19	17	
31–40	17	7	0.138
41–50	2	11	

The most common gynecological procedures that was done in both groups were dilatation and curettage and fractional curettage.

Table 2: Surgical procedures done among the study participants

Surgical Procedures	Group A	Group B	P value
Bartholin's cyst excision	5	5	
Cervical biopsy	5	3	
Perineal tear repair	1	2	
Dilatational curettage	9	11	
Fractional curettage	9	12	0.289
Hysteroscopy	6	3	
Manual vacuum aspiration	6	2	
Polypectomy	4	7	
Total	**45**	**45**	

Table 3: Comparison of study variables in two study group

Study variables	Group A	Group B	P value
Sedation score at 1 min	5.46±0.21	5.44±0.32	0.834
Sedation score at 6 min	5.66±0.78	4.33±0.24	<0.001
Sedation score at 31 min	5.89±0.66	3.56±0.14	<0.001
Post-operative recovery time	5.51±0.77	4.73±0.74	<0.001
Additional dose requirement of propofol	10	22	<0.001
Vomiting	0	2	0.238
Delirium in post-anesthesia period	3	16	<0.001
Need for Positive pressure ventilation	3	0	0.071

Sedation score was similar in both groups after 1 minute after the induction of anesthesia. The sedation score was significantly higher in group A after 5 minutes of induction of anesthesia (P value<0.001). Postoperative recovery time

was 5.51±0.77 in group A as compared to 4.73±0.74 in group B (P value<0.001). The additional dose requirement of propofol was 22.2% in group A and 48.8% in group B (P value<0.001). Delirium was seen in 16 patients in group B as compared to 3 in group A (P value<0.01). Positive Pressure Ventilation was needed for 3 patients in group A and vomiting was seen in 2 patients in group B, that was not statistically significant.

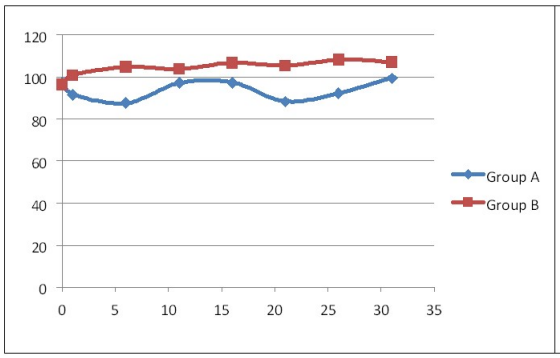

Figure 1: Changes in Heart rate

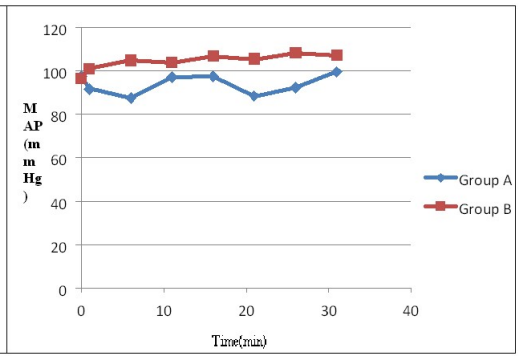

Figure 2: Changes in mean arterial pressure

In figure 1, The baseline heart rate was similar in both groups, but after 1minute of post induction, the heart rate was significantly higher in group B as compared to group A (P value<0.001).

In figure 2, The baseline mean arterial pressure was similar in both groups, but was significantly higher in group B as compared to group A from 1 minute of post-induction(P value<0.001).

Table 4: Systemic hemodynamic parameters (values expressed as mean±SD)

Value	T0	T1	T6	T11	T16	T21	T26	T31
SBP								
Group A	120.4±18.4	118±16.2	119.7±16.2	119.7±16.2	119.2±16.1	121.5±15.5	119.6±14.8	121.3±14.8
Group B	124.6±16.8	135.7±16.6	138.4±15.5	139.4±15.5	139.4±15.8	140.3±14.8	140.3±14.8	140.5±14.8
p	0.194	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DBP								
Group A	83.6±14.4	81.4±13.8	82.1±14.4	83.7±14.4	82.7±14.4	82.8±13.8	82.6±12.9	86.5±12.9
Group B	82.9±15.2	93.7±14.2	98.5±13.8	94.4±13.8	95.8±13.8	93.7±12.8	95.1±12.8	99.2±12.8
P	0.218	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
HR								
Group A	88.9±12.1	88.1±14.2	85.6±13.4	85.6±13.4	89.4±13.8	87.8±13.4	89.9±14.2	90.9±14.2
Group B	91.4±13.5	99.2±15.1	101.6±14.2	101.8±14.2	102.3±14.6	102.5±13.6	102.9±13.6	102.6±13.6
P	0.328	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

T0-baseline, T1-1min after induction, T6-6 min after induction, T11- 11min after induction, T16- 16 min after induction, T1616 min after induction, T21-21 min after induction, T26-26 min after induction, T31-31 min after induction, SBP-systolic blood pressure, DBP diastolic pressure, HR-heart rate, Significant P.

DISCUSSION

Our study included 90 patients posted for short gynecological procedures, who were equally allocated to two groups,

Group A- Propofol 2.0mg/kg + Ketamine 1.0mg/kg and

Group B- propofol 1.0mg/kg + ketamine 1.0mg/kg.

Both groups were comparable to baseline characteristics and the duration of procedures. The most common gynecological procedure carried out were missed abortions and dysfunctional uterine bleeding. In the present study considering the hemodynamic parameters we found a rise of around 10% increase in both heart rate and MAP during first minute in group B which was statistically significant (P value<0.001). Similar observation of 10% higher hemodynamic parameters in patients of group B were seen during the period 20 to 30 minutes post injection.[7] The increase in HR and MAP were not associated with any adverse cardiovascular effects. These results were similar to the data from the previous studies done by Jouguelet-Lacoste *et al.*, Da Silva PS *et al.*, Aouad MT *et al.* and Akin A *et al.*[7-9] where they had shown the increase of heart rate and the mean arterial pressure was quite obvious among the group which received lesser doses of propofol because of the cardio-respiratory depression role of the propofol and the sympatho-adrenal activation of the ketamine. Our study did not show any difference in the respiratory rate and SpO2 levels between these two groups. In the current study we found that the sedation score was higher and well maintained (Ramsay sedation score more than 5) throughout the procedure among the patients who received

higher dose of propofol (group A) compared to the group which received a lower dose of propofol and this difference was found to be statistically significant (p<.05). Saeed *et al.* and Sharieff *et al.* had shown that ketofol in the ratio of 1:2 (ketamine 1mg/kg: propofol 2mg/kg) provided effective sedation with a higher sedation score and also with a rapid recovery profile.[10,11] In our study it was shown that among the patients who received the ketofol in the ratio of 1:2 only 3 patients required a positive pressure ventilation during the procedure and the difference was not found to be statistically significant. Hui and co-workers and Mortero and co-workers had also shown a similar type of findings in their study.[12,13] The addition of low dose ketamine to propofol improves ventilation and reduces the risk of respiratory depression and also reduces the additional anesthetic drug requirement, which might be due to ketamine-induced sympathoadrenal activation.[14-16] Emergence reaction (delirium) during recovery in the form of confusion, shouting, hyperirritability, irrelevant talks and repeated tongue movements were noted in 6.6% in group A compared to 35.5% in group B and the difference was found to be statistically significant between the two groups. So a high dose combination of propofol with ketamine had shown a reduced incidence and intensity of emergency delirium which was on par with the studies by Mortero and co-workers and Sicignano and co-workers.[13,17] In the present study only 2 patients in group B developed vomiting and so it was found that nausea and vomiting did not show any statistical significant association between the groups. The additional dose requirement of propofol was 22.2% in group A and 48.8% in group B; This is because of the lesser dose of propofol given as loading dose in group B and the difference between the group was found to be statistically significant. In our study the post-operative recovery time in group A was higher (5.51 mins) compared to group B (4.73 mins) and the difference was found to be statistically significant (p value<0.001). This increase in the recovery time in group A is because of the higher dose of propofol given in group A.

CONCLUSION

Adequate analgesia and better hemodynamic parameters were seen in patients receiving a combination of propofol 2mg/kg +ketamine 1mg/kg as compared to patients who received Propofol 1mg/kg+ ketamine 1mg/kg for short gynecological procedures.

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