

## COMPARISON OF INDUCTION WITH SEVOFLURANE-FENTANYL AND PROPOFOL-FENTANYL ON POSTOPERATIVE NAUSEA AND VOMITING AFTER LAPAROSCOPIC SURGERY

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### ABSTRACT

**Introduction:** Majority of laparoscopic surgeries are associated with highest incidence of post-operative nausea and vomiting (PONV). It is one of the important concerns to choose appropriate anaesthesia drug in the laparoscopic surgeries. The aim of the present study is to perform comparison of induction sevoflurane and propofol and its effects on incidence of PONV in the first 24 hr after laparoscopic day surgery.

**Materials and Methods:** The present study has considered 60 patients in age group of 18-60 of ASA grade 1 and 2 scheduled for general surgeries. The present study has used a randomized and single blinded study. The patients have divided into two groups; those are propofol group (P group) and sevoflurane group (S Group) of 30 patients each. After completion of surgery, the patient was under observation first 24 hours in recovery room.

**Observations and Results:** The present study revealed that around 63.33 % of patients have categorized in grade 1 in group S patients. Similarly, in group P, around 90 % of patients have categorized in grade 1. The study also revealed that around 36.67% of patients have suffered with PONV ( grade 2 (3 patients) and grade 3 (8 Patients)) in group S and only 10% (grade 2 (2 patients) and grade 3 (1 patient)) of the patients have suffered with PONV in group P. The study observed that there was significant numerical difference in grade 2 and grade 3 in two groups under the study. The statistical test revealed that there was no difference between two groups.

**Conclusions:** The study observed that there was a significant numerical difference in grade 2 and grade 3 in two groups under the study. The statistical test revealed that there was no difference between in two groups.

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### INTRODUCTION

It is a very common risk that complications may arise after surgical procedures. The most common two complications are nausea and vomiting after surgical procedures. In recent research surveys revealed that when patients being prepared for the operation are questioned about their worries, PONV is the first answer (49%), and postoperative pain, is second (27%) are offered<sup>1</sup>. It is clearly revealed that the prevention of postoperative nausea and vomiting (PONV) is always improves the patient satisfaction levels and also provide cost-effective care<sup>2</sup>. An ideal general anaesthetic is useful provide very smooth and rapid induction and smooth recovery with minimal side effects such as PONV, postoperative pain and etc. after surgeries. PONV is a common problem after general anaesthesia especially in the laparoscopic surgeries. Sevoflurane and propofol drugs both are useful to provide smooth and rapid recovery with

minimal side effects. The previous studies revealed different outcomes from the sample considered in their studies. Many research studies found that P group is restricted PONV complication more effective than S group<sup>3-7</sup>. Also there are many factors which influence to get PONV during 1-6 hours in P group<sup>8</sup>. Few studies have revealed that there is no difference between group S and group P in the aspect of PONV and patient satisfaction level<sup>9-13</sup>. Hence, the present study is to compare induction with two commonly used techniques with inhalation and intravenous induction in PONV after laparoscopic surgery.

### AIMS AND OBJECTIVES

The objective of the present prospective randomized study was to perform evaluation and comparison analysis on two commonly used anaesthetic drugs i.e., S group and P group in laparoscopic surgical procedures in the aspect of incidence of PONV.

## MATERIALS AND METHODS

### Selection criteria of the patients:

The present study was conducted in attached teaching hospital after getting approval from institutional ethics committee and informed written consent of parents/guardian. The study was included 60 patients in age group of 18-50 of ASA grade 1(normal healthy patient) and ASA grade 2(the patient with mild systemic disease and no functional limitations) scheduled for laparoscopic surgeries under general anaesthesia. The study conducted was single blinded and randomized. The patients were divided into two groups, i.e., intravenous induction with propofol (group P) and inhalation induction with sevoflurane (group S). The present study has considered the patients, who are fulfilling the requirements: age 18 years to 50 years, weight of the patient is less than 100 kgs and less than 35 body mass index, ASA grade I and II scheduled for elective surgeries. The present study has also excluded the patients, who are falling in the criteria: patients with history of motion sickness and previous history of postoperative nausea and vomiting, patients using anti-emetics drugs, patient allergic to propofol.

### METHODOLOGY OF STUDY

The present study has followed a systematic methodology as follows:

#### Pre operation:

The present study has confirmed starvation with the patients. The present study was observed the patient's pre-operative conditions such as baseline preoperative pulse rate, SpO<sub>2</sub> and blood pressure with monitor such as multipara monitors. All patients were pre-medicated

with injection glycopyrolate 0.2mg/kg im 30 minutes prior to laparoscopic surgery. All the patients were pre-oxygenated with 100% oxygen for 3minutes duration.

#### Pre induction:

The present study has given IV fentanyl (1 -1.5 mcg/kg) and IV midazolam (0.02mg/kg) medication during pre-induction in both groups of patients.

#### Induction:

**In group S patients**, the present study has given induction with graded concentration of sevoflurane (8% to reduce to 2% until the patient has centralized pupil), O<sub>2</sub>, N<sub>2</sub>O and intubated with injection rocuronium 0.6mg/kg. The study also maintenance with O<sub>2</sub>, N<sub>2</sub>O, sevoflurane and muscle relaxant and IPPV was continued. Whereas, **In group P patients**, the present study has induced with propofol 2mg/kg and intubated with injection rocuronium 0.6mg/kg. The study also maintenance with O<sub>2</sub>, N<sub>2</sub>O, Isoflurane, muscle relaxant and IPPV was continued. The present study has reversed with Injection neostigmine 0.04mg/kg and injection glycopyrrolate 0.01mg/kg.

The study has observed the three important patient parameters during intra operative and after completion of laparoscopic surgeries, which are pulse rate, blood pressure, SpO<sub>2</sub>. In addition, the study has observed ECG during intra operative. The present study has adapted the following PONV scale to collect data and categorized the PONV severity on the patient. The PONV scale has given in Table 1. The present study has performed appropriate statistical test (Chi-square test) to find out any significant difference occurring in considered two groups.

**Table 1: PONV Scale.**

Grade Type	Classification details
Grade-I	None
Grade-II	Mild nausea
Grade-III	Vomiting 1-2 in 12hrs with nausea.
Grade -IV	Vomiting >3 in 12hrs with nausea.

**Observation and results:**

The present study performed whether any kind of difference observed in both groups, which were S group and P group, in terms of mean age, sex, mean weight, mean body mass index (BMI), time duration and post-operative nausea and vomiting (PONV). The observation and results were obtained from two study groups with the help of Chi-square test by using SPSS@18.0v.

Table 2 shows the characteristics of the patients from group S and group P. The study has conducted comparison analysis among two groups in the aspects of the gender of patient, mean age of patient, mean weight of the patients and mean time duration of operational procedures. The comparative analysis has revealed that there is no statistically significant difference among the groups under the present study.

**Table 2: The characteristics of the patients from group P and group S**

Characteristics	Propofol Group (n=30)	Sevoflurane Group (n=30)	p-value <sup>a</sup>
Age (years)	31.5+/- 6.5	33.6+/-7.9	0.131 <sup>NS</sup>
Weight (kg)	62.5+/- 10.8	60.5+/- 13.1	0.264 <sup>NS</sup>
BMI	23.9+/-4.6	23.64+/-4.464	0.412 <sup>NS</sup>
Time duration	83.6+/-59.9	82.0+/-50.3	0.441 <sup>NS</sup>
Values are mean ± standard deviation of mean.			
a: Independent sample t test is used to compare difference in mean values of study and control group.			
NS: Statistically Not Significant p<0.05.			

Table 3 shows comparison of patients' body mass index (BMI) Vs PONV. The present sample of the study clearly revealed that around 70% of patients whose BMI was >30% and 12% the patients whose BMI was

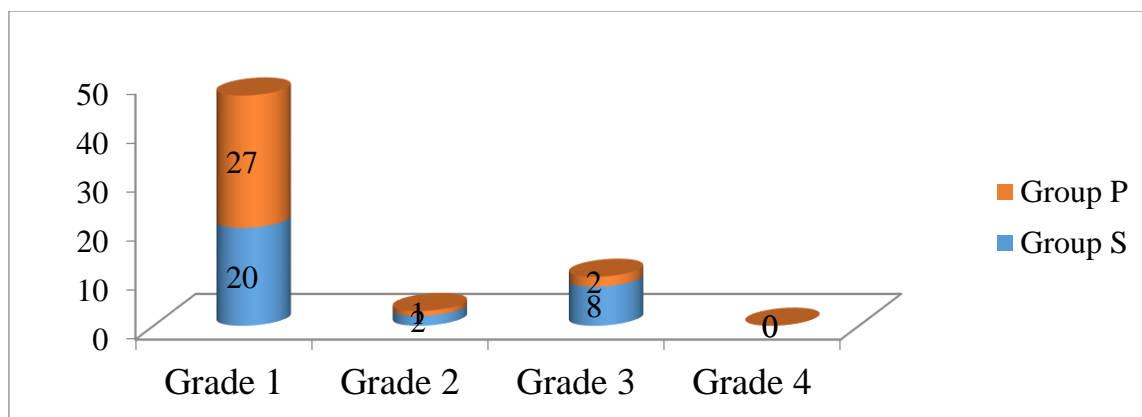
<30% were suffered from PONV. This shows that there was statistically significant difference between two groups (as P-value > 0.05).

**Table 3: Comparison of patients' body mass index (BMI) Vs PONV.**

	BMI>30	BMI<30	P- Value
Grade 1	3	44	0.000256
Grade 2	2	1	
Grade 3	5	5	
Grade 4	0	0	
	10	50	

Graph 1 clearly revealed that around 66.67% of patients have categorized in grade 1 in group S patients. Similarly, in group P, around 90% of patients have categorized in grade 1. The study also revealed that around 33.33% of patients have suffered with PONV ( grade 2 (2 patients) and grade 3 (8 Patients)) in group

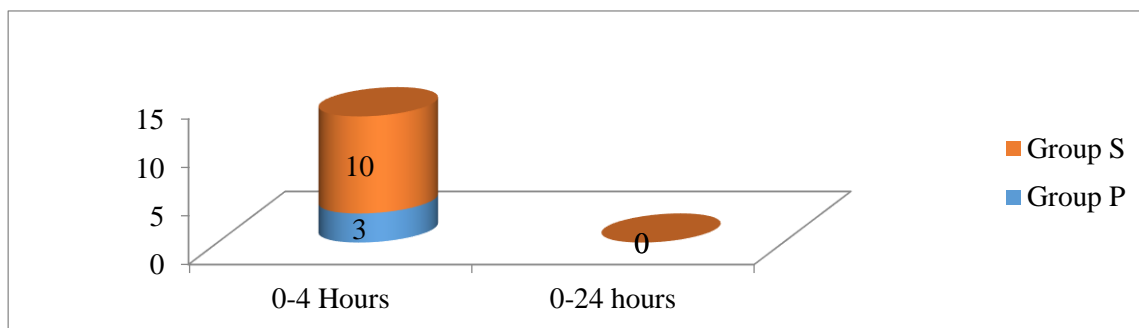
S and only 10% ( grade 2 (1 patients) and grade 3 (2 patient)) of the patients have suffered with PONV in group P. The study observed that there was significant numerical difference in grade 2 and grade 3 in two groups under the study. The statistical test revealed that there was no difference between two groups.



**Graph 1: The distribution of patients with respect to PONV grade.**

Graph 2 shows the time duration after surgery and its effects on PONV. It was indicated that around 10% of the patients reported on PONV in group P and around 33.33% of the patients suffered with PONV in group S in initial four hours only. No case was reported after four hours in the

both group of patients. The statistical analysis revealed that P-value < 0.05 (P = 0.028). Hence, the study has proved that there was significant difference appeared between two groups in terms of time duration on PONV.



**Graph 2: The time duration after surgery and its effects on PONV**

## DISCUSSION

The study has performed to compare PONV with sevoflurane -fentanyl induction and propofol-fentanyl induction within 24-hr. The study has considered 30 patients in each group. Similarly Yang et al (2004)<sup>14</sup> have performed a study and revealed that compared to propofol-fentanyl induction, sevoflurane-fentanyl induction was a clinically feasible technique for laparoscopic cholecystectomy and laparoscopic tubal ligation without causing a statistically significant difference in 24-hr moderate to severe PONV. The same study did not find any clinically significant differences in secondary outcomes, induction time, emergence time, recovery time, or costs. Whereas, Kranke et al (2009)<sup>15</sup> have performed an empirical analysis of a large antiemetic trial is intend to compare

propofol sevoflurane with respect to the incidences of PONV after strabismus surgery. The same study has concluded that patients anaesthetized with propofol showed a significantly lower incidence of nausea and vomiting compared to volatile anaesthetics such as sevoflurane. The incidence of PONV was low in propofol group as compared with sevoflurane group. Henceforth, the present has performed to reveal real facts and overcome shortcomings previous studies. To fulfill the requirements, the study has performed analysis and compared the outcome of the study with previous studies conducted in the field of research.

The study has considered 60 patients and allotted them equally in two groups. The study considered group S sevoflurane as inhalation agent whereas,

group P propofol as intravenous agent. The study has also compared both groups in the aspect of PONV with respect to PONV grading, BMI, patient gender, stage of occurrence of PONV with respect to time duration.

### **EFFECT OF BODY MASS INDEX ON PONV**

The present study further investigated whether any kind of relationship between BMI with PONV. The present study has revealed that around 70% of the patients have suffered with PONV who were in obese category (BMI>30). Whereas around 12% of the patients who suffered with PONV; were in non-obese category (BMI<30). Erk et al (2007)<sup>12</sup> have reported that the obese patients have severally suffered with PONV in laparoscopic surgery. They also observed statistically significant difference between normal BMI patients and obese patients. The present study also revealed that P value < 0.05 (P=0.000206) is statistically significant. The present study has further strengthened the outcome of Erk et al (2007)<sup>12</sup>.

### **TIME DURATION AFTER SURGERY**

The present study has observed that 10% (3 patients out of 30) and 33.33% (10 patients out of 30) of patients have suffered with PONV in initial 0-4 hours only in group P and group S respectively. Erk et al (2007)<sup>12</sup> have also revealed that a majority of PONV incidence reported during initial 0-4 hour's period. The same study reported that around 83.33% of total PONV cases were reported in initial 0-4 hours in the group P. Whereas 86% of total PONV cases were reported in the group S during the same period of time. Erk et al (2007)<sup>12</sup> have reported very limited number of PONV cases (only 12% of patients) were observed between 4-24 hours time period. However, the present study does not observed any PONV cases in 4-24 hours in both groups. Similarly, according to Shinn et al (2011)<sup>8</sup>, the majority of patients who had received sevoflurane suffered with PONV within 1

hour postoperatively because of residual volatile anaesthetics. Because the time required reducing the partial pressure of sevoflurane in the alveoli to 90% is < 30 minutes. However, the present study found statistically significant difference among two groups.

### **Effect of group P and group S on PONV**

Shinn et al (2011)<sup>8</sup> have conducted analysis and revealed that the incidence of PONV during the 24 hours post-operatively was 15.78% (3 patients) in group P and 75% (12 patients) in group S; thus, the incidence of PONV in group P during the first 24 hours post-operatively was significantly lower than group S. The present study has revealed that the incidence of PONV during the 24 hours post-operatively was 10% (3 patients) in group P and 33.33% (10 patients) in group S. It is clearly showed that the incidence of PONV in group P during the first 24 hours post-operatively was significantly lower in terms of numerically than group S. According to Singh (2013)<sup>17</sup>, the lower incidence of PONV in propofol group may be related to its "intrinsic" antiemetic properties. Gupta et al (2004)<sup>16</sup> and Erk et al (2007)<sup>12</sup> have revealed similar kind of results in their study. In similar lines, the present study also revealed that there was no statistical significant difference between two groups.

### **CONCLUSIONS**

The present study has concluded in the following points: (i) Body mass index is one of the critical influential parameter on PONV in laparoscopic surgery. (ii) Initial 0-4 hours after laparoscopic surgery is critical influential time duration after surgery on PONV in laparoscopic surgery. (iii) Incidence of PONV is more in group S as compared to group P. However, the study did not find any kind significant statistical difference among two groups. The study also observed that all the patients in both groups required only one dose rescue antiemetic in post operative period.

**REFERENCES:**

1. Tramer M.R. "A rational approach to the control of postoperative nausea and vomiting: evidence from systematic reviews. Part I. Efficacy and harm of antiemetic interventions, and methodological issues", *Acta Anaesthesiol Scand*; 2001; 45:4-13.
2. Watcha, B., Bras, P., Cieslak, G., & Pennett, J., "The dose-response relationship of ondansetron in preventing postoperative emesis in pediatric patients undergoing ambulatory surgery" *Anesthesiology*, 1995; 82: 47-52.
3. Fredman, B., Nathanson, M.H, Smith, I., Wang, J., Klein, K. and White, P.F. "Sevoflurane for outpatient anesthesia: a comparison with propofol", *Anesthesia Analgesia*, 1995; 81:823-828.
4. Joo, H.S., and Perks, W.J. "Sevoflurane versus propofol for anesthetic induction: a meta-analysis." *Anesthesia Analgesia*, 2000; 91:213-219.
5. Kim, G.H., Ahn, H.J., Kim, H-S., Bang, S.R., Cho, H-S., Yang, M. and Kim, J.A. "Postoperative nausea and vomiting after endoscopic thyroidectomy: total intravenous vs. balanced anesthesia", *Korean Journal of Anesthesiology*, 2011a; 60(6): 416-421.
6. Kim, S-J., Kwon, J.Y., Cho, A-R., Kim, H.K. and Kim, T.K. "The effects of sevoflurane and propofol anesthesia on cerebral oxygenation in gynecological laparoscopic surgery", *Korean Journal of Anesthesiology*, 2011b; 61(3): 225-232.
7. Kranke, P., Apfel, C.C., Papenfuss, T., Metterlein, T., Schuster, F., Muellenbach, R., Rauch, S., Roewer, N. "Nausea and Vomiting After Strabismus-Surgery: A Randomized Comparison of Isoflurane, Enflurane, Sevoflurane and Propofol", *The Open Clinical Trials Journal*, 2009; 1: 1-6.
8. Shinn, H.K., Lee, M.H., Moon, S.Y., Hwang, S-II., Lee C.S., Lim, H.K. and Song, J-H. "Post-operative nausea and vomiting after gynecologic laparoscopic surgery: comparison between propofol and sevoflurane", *Korean Journal of Anesthesiology*, 2011; 60(1): 36-40.
9. Deng, X., and Zhu, T., "Clinical comparison of propofol-remifentanyl TCI with sevoflurane induction/maintenance anesthesia in laparoscopic cholecystectomy", *Pakistan Journal of Medical Science*, 2014; 30(5):1017-1021.
10. Ebert, T.J., Robinson, B.J., Uhrich, T.D., Mackenthun, A. and Pichotta, P.J. "Recovery from sevoflurane anesthesia: a comparison to isoflurane and propofol anesthesia", *Anesthesiology*, 1998; 89(6):1524-1531.
11. Erk, G., Erdogan, G., Sahin, F., Taspinar, V., and Dikmen, B. "Which One Is Better Anesthetic For Laparoscopic Cholecystectomy: Desflurane, Sevoflurane or Propofol?", *The Internet Journal of Anesthesiology*, 2005; 10(2) : 8.
12. Erk, G., Erdogan, G., Sahin, F., Taspinar, V., and Dikmen, B. "Anesthesia for laparoscopic surgery a comparative evaluation –desflurane/sevoflurane vs propofol.", *Middle East Journal of Anesthesiology.*, 2007; 19(3):553-562.
13. Kirkbride, D.A., Parker, J.L., Gareth D. Williams, G.D. and Buggy, D.J. "Induction of Anesthesia in the Elderly Ambulatory Patient: A Double-Blinded Comparison of Propofol and Sevoflurane", *Anesthesia Analgesia*, 2001; 93: 1185-1187.
14. Yang, H., Choi, P.T.L., McChesney, J. and Buckley, N. "Induction with sevoflurane-remifentanyl is comparable to propofol-fentanyl-rocuronium in PONV after laparoscopic surgery," *Canadian Journal of Anesthesia*, 2004; 51(7): 660-667.
15. Kranke, P., Apfel, C.C., Papenfuss, T., Metterlein, T., Schuster, F., Muellenbach, R., Rauch, S., Roewer, N. "Nausea and Vomiting After Strabismus-Surgery: A Randomized Comparison of Isoflurane, Enflurane, Sevoflurane and Propofol", *The Open Clinical Trials Journal*, 2009; 1: 1-6.
16. Gupta, A., Stieres, T., Zuckerman, R., Sakima, N. and Parker, S.D. "Comparison of recovery profile after ambulatory anesthesia with propofol, isoflurane, sevoflurane and desflurane: A systemic review.", *Anesthesia Analgesia*, 2004; 98(3):632-641.
17. Singh, S.K., Kumar, A., Mahajan, R., Katyal, S., Mann, S. "Comparison of recovery profile for propofol and sevoflurane anesthesia in cases of open cholecystectomy", *Anesthesia: Essays and Researches*, 2013; 7(3); 386-389.