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Original Research Article

To Compare the Hemodynamic Changes after Priming Dosage and Induction Dosage of Propofol

Madhu Priya[1], Sudhir Tripathi[2], Ajit Gupta[3]

[1]Post-Graduate 3rd Year, Department of Anesthesiology and Critical Care, Narayan Medical College and Hospital, Sasaram, Bihar, India
[2]Post-Graduate 3rd Year, Department of Anesthesiology and Critical Care, Narayan Medical College and Hospital, Sasaram, Bihar, India
[3]Head of Department, Department of Anesthesiology and Critical Care, Narayan Medical College and Hospital, Sasaram, Bihar, India

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Corresponding author: Dr Sudhir Tripathi
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Abstract

Aim: Use of priming principle in the induction dose requirement of propofol and its hemodynamic stability.

Methods: This prospective study was conducted in the Department of Anaesthesiology Narayan Medical College and Hospital, Sasaram, Bihar, India. 100 patients of age between18-55 years, come under ASA-I or ASA-II category undergoing surgery which requires general anaesthesia as a mode of anaesthesia chosen to determine effect of priming principle in relation to Propofol.

Results: Two groups were comparable to each other with respect to age, weight, ASA physical status. There was no significant difference in baseline pulse rate & baseline SBP, DBP & MAP, oxygen saturation between group S & Group C (p value > 0.05).The mean induction dose in group S was 80.37±14.82 and in group C it was 112.27±17.68. Thus we observed a 30% reduction in induction dose requirement in group S. The rise in Pulse rate was highly significant at one minute after induction, during intubation, immediately after intubation & 5 minutes later. There was highly significant fall in MAP at one minute after induction, during intubation, immediately after intubation and 5 minutes later. The changes in SBP & DBP followed the same pattern as MAP. There were no statistically significant changes in SP02 in both the groups. Incidence of hypotension was more in group C while post-suxamethonium fasciculation's was more in group S.

Conclusion: The Priming principle when applied for the induction agent like Propofol is associated with significant reduction in total induction dose requirement of Propofol and improved peri-intubation hemodynamic stability.

Keywords: Priming principle, Propofol, hemodynamic stability

Introduction

Priming principle refers to administration of a small sub anaesthetic dose of an agent prior to its actual full anaesthetic dose. Schwartz et al [1] by trial and error proposed that 15-20% of the customary intubation dose can be used for priming

and was referred as 'priming dose'. The sum of priming and intubation doses is smaller than the conventional intubating dose. Priming principle carries this advantage and also additional property of decreasing the frequency and severity of dose related side effects, reveals undiagnosed, pathologic or idiopathic increased sensitivity to the anaesthetic agent.1 This technique had been widely practiced in relation to the non-depolarizing type of muscle relaxants to hasten their onset of action. [2,3]

Propofol is the most recent intravenous anaesthetic agent released for general use in 1989. Propofol is the most frequently used intravenous agent for induction and maintenance of anaesthesia as well as for sedation during regional anaesthesia or intensive care unit. Use of propofol has advantages like fast induction, short duration of action, fast and clear-headed recovery, inactive metabolites, no post-operative nausea, vomiting and patient rapidly becoming roadworthy. The main disadvantages are pain on injection, hypotension, bradycardia, anaphylaxis reactions and high cost. A decrease of 26-28% of systolic blood pressure, 19% of diastolic blood pressure and 11% of mean arterial pressure, without any change in systemic vascular resistance and cardiac output were observed when patients are induced with 2mg/kg of propofol. [4,5] Most of these hemodynamic side effects of propofol are dose related. A search of the literature reveals that many methods were used to reduce the induction dose requirements of propofol, like use of nitrous oxide, opioids, barbiturates like thiopentone, benzodiazepines like midazolam, use of local anaesthetic, magnesium sulphate and use of 'Priming Principle'. [6,7] As priming causes reduction in dose requirement, we hypothesized that its application for propofol induction would reduce its dose related side effects.

Material and Methods

This prospective study conducted in the Department of Anaesthesiology, Narayan Medical College and Hospital, Sasaram, Bihar, India.

Methodology

Using universal sampling technique total 100 patients of age between 18-55 years, come under ASA-I or ASA-II category undergoing surgery which requires general anaesthesia as a mode of anaesthesia chosen to determine effect of priming principle in relation to Propofol.

Inclusion criteria

- Adult patients of both sexes between 18-55 years of age
- Patients undergoing elective surgeries undergoing general anaesthesia
- Patients of ASA status-I &II.

Exclusion criteria

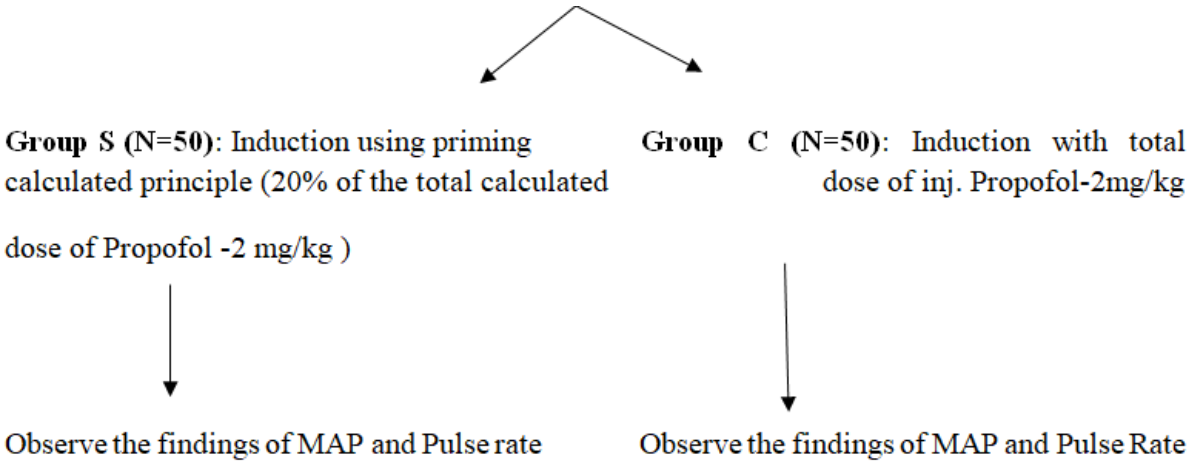
- Unwillingness of the patient,
- History of allergy to opioids, eggs
- History of opioid abuse,
- Patient is on opioid analgesic, phenothiazine, tranquilizer, sedatives, hypnotics or any other CNS depressants.
- Patient with impaired respiration (bronchial asthma, Chronic Obstructive Pulmonary Disease), severe infection or uraemia
- History of severe cardiac disease, renal/hepatic/cerebrovascular disease.
- Anticipated difficult intubation.
- Pregnant & lactating women.

Methodology

All the selected patients were explained about the purpose, procedure & side effects of the study. After this a written & informed consent was taken. Tab. ranitidine 150 mg & Tab, diazepam 10 mg was given to all patients the night before the surgery.

Group of patients: Patients were randomly allocated into 2 groups of 50 patients each.

All the selected patients were explained about the purpose, procedure & side effects of the study. After this a written & informed consent will be taken. Patients will be allocated into 2 groups.



Statistical analysis:

The results of study were tabulated & compared. Chi square test was used for qualitative data. For rest of the quantitative data student unpaired t test was used $p<0.05$ was considered as significant & $p<0.001$ was considered as highly significant.

Results

Two groups were comparable to each other with respect to age, weight, ASA physical status. There was no significant difference in baseline pulse rate & baseline SBP, DBP & MAP, oxygen saturation between group S & Group C (p value > 0.05).

Induction Dose Requirement

The mean induction dose in group S was 80.37 ± 14.82 and in group C it was112.27 ± 17.68. Thus we observed a 30% reduction in induction dose requirement in group S.(table1)

Table: 1 Mean Induction dose Requirement of Propofol

Group	Mean Induction dose (mgms)	p-value
Group S	80.37±14.82	**<0.001**
Group C	112.27±17.68	

Pulse Rate

The rise in Pulse rate was highly significant at one minute after induction, during intubation, immediately after intubation & 5 minutes later.(Table2)

Table: 2 Changes in the Mean Pulse Rate (BPM)

Time	Group S	Intragroup p value	Group C	Intragroup p value	Intergroup-value
Baseline	91.53±13.26	>0.05	89.17±12.43	>0.05	>0.05
Just before induction	89.93±14.53	>0.05	88.16±12.97	>0.05	>0.05
One minute after induction	89.56±15.21	>0.05	98.46±12.1	<0.001	<0.001
During intubation	91.13±13.57	>0.05	104.4±12.38	<0.001	<0.001
Immediately after intubation	95.06±13.88	>0.05	109.3±10.6	<0.001	<0.001
5 minutes later	93.53333±12.54	>0.05	105.76±10.4	<0.001	<0.001

Mean Arterial Pressure (MAP)

There was highly significant fall in MAP at one minute after induction, during intubation, immediately after intubation and 5 minutes later. (Table3)

Table: 3 Changes in Mean Arterial Pressure (Mm of Hg)

Time	Group S	Intra group p value	Group C	Intra group p value	Inter Group p-value
Baseline	101.97±9.49	p>0.05	98.7±21.65	p>0.05	>0.05
Just before induction	98.13 ±11.6	p>0.05	99.26±12.16	p>0.05	>0.05
One minute after induction	95.6±10.2	p>0.05	84.03±11.9	<0.001	<0.001
During intubation	97.86±8.46	p>0.05	83.66±11.5	<0.001	<0.001
Immediately after intubation	99.8±9.15	p>0.05	85.4±10.4	<0.001	<0.001
5 minutes later	96.23±9.77	p>0.05	86.23±11.9	<0.001	<0.001

A. The changes in SBP & DBP followed the same pattern as MAP.
B. There were no statistically significant changes in SP02 in both the groups.
C. Incidence of hypotension was more in group C while post-suxamethonium fasciculation's was more in group S.[9](Table 4)

Table: 4 Side Effects or Complications

Side effects Or Complications	Group S	Group C	p-value
Pain on injecting Propofol	8	10	p>0.05
Respiratory depression	9	13	P>0.05
Postsuxamethonium fasciculation's	20	9	p<0.001
Hypotension	4	22	P<0.001

Discussion

"Priming principle" is a technique of giving a pre-calculated dose of induction agent prior to giving the full dose of same induction agent; this technique is also known as "the auto co-induction". [8,14-16 9-11]

Propofol is known to produce sedation and anxiolysis at low, doses. Initial administration of low dose (priming dose) of propofol (20% of the total dose requirement) is thought to produce anxiolysis and thereby reduces the associated sympathetic drive and the induction dose to produce hypnosis. [8,11-13] Thus we observed a 30% reduction in the induction dose requirement of propofol by applying priming principle, which is statistically highly significant.(p<0.001)

The application of priming principle is associated with the stability in the pulse rate during peri-intubation period compared to control group. [8]

Also there was a lesser fall in SBP, DBP& MAP at one minute after induction, during intubation, immediately after intubation and 5 minutes later.

Propofol is known to have a biphasic effect on the cardiovascular system. Firstly, immediately after injection, decrease in the systemic vascular resistance and mean arterial pressure predominate. This decrease in the systemic vascular resistance causes reflex increase in the sympathetic activity, which is mediated by the baroreceptors present in the carotid sinus and aortic arch, thereby causing an increase in the heart rate. [9,13,14,15]

Secondly, from 2 minutes after injection, despite less than normal systemic vascular resistance, the heart rate and stroke volume are decreased to less than baseline. This is attributed to "resetting" of the baroreceptor reflex to a smaller pressure value than normal by propofol. [8,12,16,17]

The lesser fall blood pressure in propofol group was probably because of reduction in total induction dose of propofol after its autoco-induction. [12-14]

We looked for various **side effects and complications** during our study like pain on injecting propofol, respiratory depression, hypotension and post-suxamethonium fasciculation's. The lower incidence of pain on injection of propofol in our study could be attributed to injecting propofol in the larger peripheral vein and prior administration fentanyl. [18,19] Hypotension was seen in group C compared to group S because of the greater amount of dose requirement of propofol and consequent dose dependent fall in blood pressure. But this seemed to be transient and within physiological limit and didn't require any intervention. [8,11,20] Post-suxamethonium fasciculat - ion's was found more in group S compared to group C. It has been documented through several studies that the incidence of fasciculation's varies with the depth of anaesthesia at the time of administration of suxamethonium. The lesser incidence of fasciculation's in group C of our study can be attributed to the adequate depth offered by bolus dose of propofol. Logical thinking implies that the patients of group S in our study received only about 70 % of the bolus dose of propofol, which obviously could not offer protection against occurrence of fasciculations. Anil kumar et al. [8] observed the same pattern of side effects as in our study. [21]

Conclusion

Hence, Priming principle when applied for the induction agent like Propofol is associated with significant reduction in total induction dose requirement of Propofol and improved peri-intubation hemodynamic stability.

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