



TO STUDY THE EFFECTS OF PRELOADING WITH INTRAVENOUS COLLOIDS ON PROPOFOL- FENTANYL INDUCED HEMODYNAMIC CHANGES DURING GENERAL ANAESTHESIA

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ABSTRACT Propofol and fentanyl are the commonly used drugs for induction of general anaesthesia. Propofol when given alone does not cause much changes in hemodynamic status in healthy (ASA grade I) individuals. When it is given in combination with fentanyl it causes detrimental effects in patients especially compromised patients like hypotension and other cardio respiratory disturbances. These hazardous and fatal effects can be reduced and eliminated by preloading the patients with colloid solutions. We studied a group of 60 patients of our hospital undergoing surgery without preload with colloids then with preloads. Patients were operated under general anaesthesia induced with propofol and fentanyl. We concluded that fluid preload is beneficial to counter the harmful effects of propofol and fentanyl combination

KEYWORDS : Propofol, fentanyl, hemodynamic

INTRODUCTION

General anaesthetics are the drugs that produce reversible loss of sensation and consciousness. A wide variety of chemical agents produce general anaesthesia. In the modern practice of balanced anaesthesia these modalities are achieved by using combination of drugs for each specific purpose. These drugs may be in the form of inhalational or intravenous agents. Propofol is the recent intravenous anaesthetic agent used in clinical practice. It is used for induction and maintenance of anaesthesia as well as sedation but it does not have analgesic property. It is short acting and has no residual effect. So it is used very commonly with short acting opioids like fentanyl or alfentanil which possesses good analgesic effects. This combination is commonly used in day care surgeries where early ambulation is required. When both propofol and fentanyl are used during induction of general anaesthesia they have effects on blood pressure and heart rate. Propofol inhibits sympathetic vasoconstriction causing vasodilation so causing fall in blood pressure^{1,2}. It is reported that it decreases 25-40% systolic pressure and diastolic pressure^{3,4}. Propofol is a vasodilator and myocardial depressant drug but it does not change heart rate significantly. Fentanyl is a synthetic opioid. Most evidences indicate that it does not change arterial blood pressure, heart rate, cardiac output or pulmonary vascular resistance. Pulmonary wedge pressure remains unchanged with fentanyl^{5,6}. But the combination of propofol with fentanyl may produce significant changes in haemodynamic parameters. Fentanyl produces conduction delay while propofol reduces blood pressure. These changes are well tolerated in healthy patients (ASA grade I) but will be detrimental in patients with systemic diseases. It is better to control these changes before their occurrence following concomitant use of propofol and fentanyl.

Subarachnoid block produces fall in blood pressure and this can be prevented by preloading the patient with intravenous fluids. And so hemodynamic changes induced with propofol and fentanyl can also be prevented by preloading with intravenous fluids. In the present study the patients were preloaded with colloids over a period of 30 minutes before induction of anaesthesia. Hemodynamic changes were measured before and after induction of anaesthesia in two groups.

MATERIAL AND METHOD

This retrospective study was conducted in the Department of Anaesthesiology, Critical Care and Preoperative Medicine, Rama Medical College Hospital and Research Centre, Pilkhuwa, Hapur, U.P., India. 60 patients between 20-50 years of age of both sexes belonging to ASA grade-I were included in the study. These patients were scheduled for different elective surgeries under general anaesthesia. Pre-anaesthetic check-up of all the patients was done. All the relevant investigations were carried out e.g. Hb, BT, CT, TLC,

DLC, Platelets counts, blood sugar, blood group, renal function tests, liver function tests, urine complete examination, HIV, HCV, HbsAg, chest X-ray and ECG. were Patient with difficult intubation, h/o drug allergy, renal, hepatic and neuromuscular diseases were not included in the study.

Premedication: All patients were kept nil orally in the night before surgery. All patients received tab. alprazolam 0.25mg.

ranitidine 150 mg orally in the night before and at 6.00AM on the day of surgery with a sip of water.

A total number of 60 patients were selected for the study. Patients were randomly divided in two groups of 30 patients each.

Group A: No preloading with fluids was given.

Group B: Received 15ml/kg colloid over 30 min just before induction.

Induction of anaesthesia: Base line heart rate, systolic and diastolic blood pressure were recorded at the time of fluid infusion and at the end of infusion. Patients were given 100% oxygen for three minutes. Induction was done with fentanyl 1.5 µg/kg and propofol 2.5mg/kg over a period of 30 seconds. Endo tracheal intubation was performed with vecuronium 0.1mg/kg and maintained on oxygen, nitrous oxide and isoflurane with controlled ventilation. EtCO₂ monitoring done in laparoscopic Surgeries and was maintained within normal range (30-40 mmHg).

Any decrease in systolic blood pressure > 20% of base line was defined as hypotension and heart rate < 60 beats per minute was considered bradycardia.

Observed parameters:

- Heart rate: Heart rate was measured at the beginning of fluid preloading and every 2 minutes up to 20 minutes after induction.
- Systolic, diastolic and mean arterial blood pressure at base and line at the end of fluid load and every 2 minutes up to 20 minutes after induction was noted.
- SpO₂ and ECG monitored throughout the surgery.
- EtCO₂ monitored throughout the laparoscopic surgery.

On completion of study observations were tabulated and analysed. Demographic and clinical data were analysed to see the effect of fluid preloading.

Table 1: Demographic data

Group A: The mean age was 37.70±6.91 yrs.

Group B: The Mean age was 37.97± 6.83 yrs.

Table 2. Surgical procedures in the study

Surgeries	Group A Without Preload	Group B Preload With Colloid
Laparoscopic cholecystectomy	17	18
Pyelolithotomy	7	7
Colostomy	1	
Fibroadenoma breast	2	5
Ileostomy	1	
Hysterectomy	1	
Exp. Laparotomy	1	

Total no. Surgeries –60 and these were all different operations.

Table 3. Comparison of heart rate in two groups

Time	Group A Mean± S.D.	Group B Mean ± S.D
Base line	83.53 ± 6.12	81.66 ± 6.63
At Induction	79.20 ± 5.33	76.43 ± 5.51
2 min	78.90 ± 6.99	74.07± 4.94
4 min	78.23 ± 7.89	75.43± 6.85
6 min	77.93± 7.79	76.47± 5.03
8min	79.00± 7.19	77.17 ± 5.99
10 min	79.10± 6.63	78.50± 5.31
12 min	77.40± 5.66	78.50 ± 4.71
14 min	77.20± 5.16	79.20± 4.73
16 min	77.20 ± 5.19	79.43± 4.31
18 min	78.40 ± 6.17	79.57± 4.50
20 min	79.17± 5.65	80.10± 4.72

This table shows mean of heart rate with standard deviation in two groups before preloading at the time of induction and then every 2 minutes for 20 minutes. In both groups the pattern showed decrease in heart rate from base line but slight increase at 8-10 min. which shows slight stress response due to laryngoscopy. Decrease in heart rate was statically significant in two groups (p<0.001).

Table 4. Comparison of systolic blood pressure in two groups

Time	Group A Mean ±S.D	Group B Mean ±S.D
Base line	121.40 ± 7.45	119.00 ± 4.5
At Induction	115.83 ± 5.84	120.60± 2.53
2 Min	103.80± 10.79	115.10± 4.12
4 Min	105.83± 11.28	113.27± 3.77
6 Min	110.73± 11.93	118.00± 3.64
8 Min	112.70± 11.86	120.57± 4.01
10Min	113.97± 10.96	121.23± 3.52
12 Min	112.70± 10.61	121.80± 2.70
14 Min	113.87± 10.01	120.53± 3.96
16 Min	115.57± 9.99	119.63± 3.72
18 Min	117.40± 9.49	119.13± 4.15
20 Min	117.50± 9.28	119.37 ± 3.87

This table shows mean systolic pressure with standard deviation in both groups. In both groups systolic blood pressure decreased from base line value but slightly increased at the time of intubation which occurred at 10 min.(p<0.001)

Table 5. Comparison of Diastolic Pressure in two Groups

Time	Group A Mean ±S.D	Group B Mean ±S.D
Base Line	77.67 ± 6.08	77.63± 3.97
At Induction	76.10± 4.95	78.87± 2.56
2 Min	68.27± 7.18	74.90± 2.95
4 Min	70.97± 8.33	73.90± 2.52
6 Min	73.03± 8.21	76.60± 3.08
8 Min	73.93± 8.23	79.37± 3.49
10 Min	75.20± 7.45	80.27± 3.26
12 Min	74.37± 6.75	80.23± 3.10
14 Min	74.50± 7.94	80.23 ± 2.57
16 Min	75.77± 7.91	79.67± 2.68
18 Min	76.30 ± 6.52	79.20± 2.94
20 Min	76.13± 6.09	79.07 ± 2.86

This table showed the mean diastolic pressure and standard deviation in two groups. In study group A the diastolic pressure decreased from the corresponding base line value except at the time of intubation which was at 10 minutes and at the end it touched the base line. (P < 0.001).

Table: 6 Comparison of SPO2 in two group

Time	Group A Mean ±S.D	Group B Mean ±S.D
Base line	98.63± 0.67	98.93± 0.37
At Induction	99.60± 0.50	99.46± 0.51
2 Min	99.47± 0.51	99.50± 0.51
4 Min	99.70± 0.60	99.90± 0.40
6Min	99.97± 0.18	99.80± 0.48
8 Min	99.83± 0.46	99.90± 0.31
10 Min	99.40± 0.77	99.90± 0.32
12 Min	99.57± 0.57	99.83± 0.46
14 Min	99.67± 0.55	99.80± 0.55
16 Min	99.80± 0.41	99.83± 0.46
18 Min	99.73 ± 0.53	99.93 ± 0.37
20 Min	99.80± 0.48	99.93 ± 0.38

Table no. 6: This table showed mean of oxygen saturation with standard deviation in two groups.

DISCUSSION

Propofol is supposed to be a very good drug for intravenous sedation. It has short duration of action. On intravenous administration it produces various hemodynamic effects generally dose dependant. It causes peripheral vasodilatation and to some extent myocardial depression. Propofol anaesthesia is administered with fentanyl which is a short acting synthetic narcotic to provide analgesia. Fentanyl in therapeutic doses doesn't possess any significant effect on blood pressure, heart rate or other parameters of cardiovascular system. But when used in combination with propofol the toxic effects are synergised. These toxic effects are hypotension, asystole or respiratory depression. Hypotension produced in any case is threatening particularly in compromised patients. So it is better to prevent the hypotension and other adverse cardiovascular effects. As all know hypotension induced by subarachnoid block is prevented by preloading the vascular compartment with the colloid fluids^{14, 15}. On this basis present study was designed.

In this study 60 patients were randomly chosen and divided in two groups (A and B) of 30 each. Group A did not receive any fluid preload and it was considered as control group. In group B patients received fluid preload with 15ml/kg body weight colloid (3.5% gelatine). All patients received inj. Fentanyl (1.5µg/kg) and inj. Propofol (2.5 mg/kg for induction of anaesthesia. Anaesthesia was maintained with O₂/N₂O, isoflurane and vecuronium 0.1mg/kg with controlled ventilation. Heart rate, SPO₂, blood pressure were recorded just before preloading and at the time of induction of anaesthesia then every 2 minutes up to 20 minutes. The recorded data were compared to find the efficacy of fluid preloading. Etco₂ was maintain within normal range (30-40mm Hg). The results of present study showed statistically significant reduction in heart rate, systolic and diastolic blood pressure in comparison to their base line value.

In control group A, base line heart rate was 83.53± 6.12 which decreased further and it was associated with decrease in systolic, diastolic and mean arterial pressure. In group B there was not much changes in heart rate as in group A. These changes were statistically significant (P<0.001).

The findings of this study are comparable with other studies. Aun⁷ et al (1984) studied the effect of propofol. They observed a significant decrease in systolic, diastolic and mean arterial pressure. In some studies it has been quoted that propofol if given alone does not change heart rate but when given with fentanyl significant change in heart rate occurred^{8,9,16}. A. Vohra and E. Woodey^{10,11} in 1999 had observed no significant changes in heart rate with propofol administration. J.P. Williams¹² et al in (1986) observed no change with propofol alone but there was significant fall in heart rate when used with fentanyl.

In the present study systolic, diastolic and mean arterial pressure was decreased in two groups following administration of propofol and fentanyl. The maximum changes were at initial time of induction of anaesthesia. On group to group comparison the maximum fall in

parameters was in group A (control group) but less fall in group B. The effect of hypotension could be minimised with preloading the patient with colloids.^{13,14,15}

CONCLUSION:

In this study we found that propofol and fentanyl when given in combination cause fall in blood pressure during induction of general anaesthesia. The probable causes were peripheral vasodilatation, myocardial depression and conduction delays in heart muscles. There was not much change in oxygen saturation. We conclude that intravascular preloading with colloid just before the induction of anaesthesia with propofol and fentanyl is advantageous to control haemodynamic changes. This in accordance with other previous studies.

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