ORIGINAL ARTICLE

Frequency of Hypotension after Induction of Anesthesia with Propofol using Prophylactic Intramuscular Ephedrine Versus Sterile Water

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ABSTRACT

Background: Propofol is a widely used anesthetic drug but it has some complications like pain, bradycardia and hypotension.
Aim: To compare the frequency of hypotension using prophylactic intravascular ephedrine and sterile water, after induction of general anesthesia with propofol.
Methods: This was a randomized controlled trial. Total 100 patients undergoing elective surgical procedure were included and divided into two equal groups A and B by using random number table. Each group comprised of 50 patients. In group A intramuscular 10mg ephedrine in 2cc volume,15 minutes before induction of general anesthesia was given. In group B 2cc sterile water was given intramuscular, 15 minutes before induction in Gluteus Maximus muscle.
Results: Blood Pressure, heart rate, O_2 Saturation and ECG monitoring was applied to all patients. Induction of anesthesia was done with injection propofol 2mg/kg body weight, Nalbuphine 1mg/kg and intubation with cuffed ETT by using Atracurium Besylate 0. 5mg/kg. Anesthesia was maintained with 50% N_2O in O_2 and isoflurane at 1.2 MAC. Data entry and analysis was done by using SPSS version 11. The significance of difference in the frequency of hypotension in the two groups was tested by Chi-square test.
Conclusion: Prophylactic administration of intramuscular ephedrine is very effective and it reduced the incidence of hypotension.
Keywords: Hypotension, propofol, Ephedrine, sterile water.

INTRODUCTION

Cardiovascular complications are the most common cause of post-operative morbidity and mortality in patients who undergo surgery[1]. Hypotension occurs frequently during induction of anesthesia with propofol. There is a severe fall in blood pressure particularly in hypertensive patients. This hypotension is due to a fall in systemic vascular resistance and cardiac contractility. This effect is more pronounced with large dose, rapid injection and in old age[2]. Propofol is one of the most common drug used in the induction of anesthesia. Propofol is 1% aqueous solution[3]. It is the agent of choice in pediatric and outpatient anesthesia[4].

Proprofol also has anti-inflammatory properties and can suppress cytokines and chemokines production[5]. Propofol and etomidate depress the neurons in the cortex, thalamus and reticular formation and produce un-consciousness[6]. Propofol is superior to midazolam in reducing inflammation and oxidase stress and improving post-operative recovery in children[7].

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Ephedrine is an indirectly acting sympathomimetic amine. It is a commonly used vasopressor during anesthesia[8]. Ephedrine has also been reported to posses' antiemetic properties. For this reason it is a common drug for treating hypotension during regional anesthesia[9].

Ephedrine can be administered intravenously or intramuscularly, either alone or admixed with propofol to treat hypotension[10]. For this reason prophylactic administration of intramuscular ephedrine prior to induction of anesthesia is advantageous[11]. The propofol exert its sedative and hypnotic effect through an interaction with gamma-aminobutyric acid (GABA), the principal inhibitory neurotransmitter in the CNS[12]. Renal and hepatic diseases have no clinically significant effect on the metabolism of propofol[13]. The adverse effect of ephedrine includes CNS stimulation, raised MAC and tachyphylaxis[14].

MATERIAL AND METHOD

After approval of study from the hospital ethics committee hundred patients undergoing surgical procedure in general anesthesia were included and divided into two equal groups A and B by using a random number table. Each group was comprised 50

patients. In group A ,10 mg ephedrine in 2cc volume given in Gluteus maximus muscle, 15 minutes before induction of general anesthesia. Similarly in group B 2cc sterile water was given 15 minutes before induction, in Gluteus maximus muscle. Written informed consent from each patient was taken. An intravenous line was secured in all patients with 18G cannula. Blood pressure, ECG, pulseoximeter and O_2 was applied to all patients.

Baseline blood pressure reading was recorded at two minutes interval for 4 minutes before administering im ephedrine in group A. The baseline was taken as the lowest MAP record in the two groups. Injection was given by anesthesia assistant so the anesthetist doing induction of aesthesia is unaware of the drug given. Induction was done with Propofol 2mg /kg IV, inj. Nalbuphine 0.1mg /kg, Atracurium besylate0.5mg/kg and after passage of ETT, anesthesia maintained with 50% N_2O in O_2 and isoflurane 1.2 MAC. The following parameters were assured at following time intervals. Baseline mean arterial pressure (MAP), MAP before induction (10 minutes after im injection) during intubation and in 1st, 4th, 7th, and 10th minutes after induction and reading of MAP reading less than 25% of the baseline was labelled as hypotension. Data was entered and analyzed using SPSS version 11 software programme and P-value ≤ 0.05 was taken as significant.

RESULTS

According to results of this study 18% of patients showed hypotension in groups A, while rest of 82% patients did not showed hypotension. Whereas in group B (control) 58% of patients showed hypotension, mean age of all patients was 36.26±12.38 years. Mean age of patients in group A and B was 36.60±12.68 and 35.92±12.19 years respectively (Table 1). Gender distribution shows that in group A 22 patients were male and 28 patients were females. In group B 17 patients were male and 33 patients were female (Table 2). Mean arterial pressure in group A patients was 85.97±10.24 and in group B patients 93.40±6.51 respectively (Table 3).

Table 1: Descriptive Statistics for age of all patients in treatment groups

	Treatment		Total
	Group-A	Group-B	
N	50	50	100
Mean	36.60	35.92	36.26
SD	12.68	12.19	12.38
Minimum	18.00	8.00	8
Maximum	70.00	60.00	70

Group A = Experimental Group: I. M. Ephedrine
Group B = Control Group: Sterile Water

Table 2: Gender Distribution of patients in treatment groups

Gender	Treatment		Total
	Group-A	Group-B	
Male	22(44%)	17(34%)	39(39%)
Female	28(56%)	33(66%)	61(61%)

Group A = Experimental Group: I. M. Ephedrine
Group B = Control Group: Sterile Water

Table 3: Descriptive statistics for mean arterial pressure of patients in treatment groups

	Treatment		Total
	Group-A	Group-B	
N	50	50	100
Mean	85.97	93.40	89.69
SD	10.24	6.51	9.31
Minimum	63.33	84.67	63.33
Maximum	102.00	107.67	107.67

Group A = Experimental Group: I. M. Ephedrine
Group B = Control Group: Sterile Water

Table 4: Descriptive statistics for mean arterial pressure of patients in treatment groups

Intubation	Treatment	
	Group A	Group B
	Mean ± SD	Mean±SD
Before Induction (TI)	89.28±10.59	93.08±6.60
During Intubation (T2)	90.98±11.47	77.44±6.80
1st Minute after Intubation (T3)	92.88±11.98	81.00±6.71
4th Minute after Intubation (T4)	93.38±12.26	84.48±6.89
7th Minute after Intubation (T5)	90.48±10.85	86.28±6.80
10th Minute after Intubation (T6)	89.68±10.07	88.38±6.31

Group A = Experimental Group: I. M. Ephedrine
Group B = Control Group: Sterile Water

Table 5: Frequency of hypotension in relation to treatment group

		Group-A	Group-B	Total
Hypotension	Yes	9(18%)	29(58%)	38(38%)
	NO	41(82%)	21(42%)	62(62%)
Total		50	50	100

Group–A = Experimental Group : I.M Ephedrine
Group–B = Control Group : sterile Water
Chi-Square= 16.97
P value=0.000 (Significant: p-value ≤ 0.05)

Mean arterial pressure before intubation, during at 1st minute, 4th minute, 7th minute and at 10th minute was noted in both groups patients. Before intubation mean arterial pressure in group A and group B was 89.28±10.59 and 93.08±6.60. During intubation 90.98±11.47 in group A and 77.44±6.80 in group B. At 1st minute after intubation 92.88±11.98 in group A and in group B it was 81.00±6.71. At 4th minute after intubation mean arterial pressure in group A and B was 93.38±12.26 and 84.48±6.89. At 7th minute after intubation mean arterial pressure in both treatment groups was 90.48±10.85 and 86.28±10.07 and in

group B mean arterial pressure was 88.38±6.31 respectively (Table 4). In group A 9 patients had hypotension whereas in group B 29 patients suffered from hypotension. Patients in group A had lower frequency of hypotension as compared to group B patients i.e., P-value = 0.000 (Table 5).

DISCUSSION

Intraoperative hypotension is a common and frequent side effect of anesthesia. In this clinical trial, we studied the effect of prophylactic intramuscular ephedrine in general anesthesia by propofol. In the study of Austin JD and Parke TJ they concluded that adding ephedrine to propofol is as effective as lidocaine in reducing pain, with benefit of off setting the hypotensive effect of propofol[15]. In the study of Rasooli et al they conclude that although there are some positive effects of ephedrine in prevention of hypotension but because of potential hazards of increase in heart rate in elderly and seriously ill patients the use of prophylactic intramuscular ephedrine is not recommended to reduce this complication[16]. In the study of Ayatollahi et al they reported that ephedrine can be an effective drug with acceptable response for both pain management and haemodynamic controle[17]. Similarly in the study of Eren et al they compared the effect of ephedrine with placebo and his results also favours our study results[18]. In the study of Ozkocaki et al they compared the effect of ephedrine and ketamine with placebo and concluded that ketamine and ephedrine increase blood pressure but only ketamine has positive effect to decrease pain[19].

Similarly in the study of Rokhtabnak and Pournajafian AR they got the similar results[20]. In the study of El-tahan MR he concluded that injection of ephedrine can prevent hypotension induced by porpofol anesthesia in cardiac valve surgery[21].

CONCLUSION

Prophylactic administration of intramuscular ephedrine reduced the incidence of hypotension in significant number of patients.

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