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Usefulness of an IV Dose to Attenuate the Haemodynamic Response to Extubation

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Abstract

Aim: Consistent and reliable protection against rise of heart rate and blood pressure during extubation has been aimed at by using propofol in this study. *Materials and Methods*: It was studied in 50 patients of ASA Grade I & II between age groups 20 - 46 years. 25 patients of comparable age, weight and ASA status were taken as control. Premedication was by glycopyrrolate 0.2 mg 30 minutes prior to induction of anaesthesia. Anaesthesia induced with thiopentone sodium 5 mg/kg intubation was performed with suxamethonium and maintained with 0_2 and N_2O with vecuronium as a muscle relaxant, pethidine 1 mg/kg. Patients belonging to the study groups received bolus doses of either 1 mg/kg of lignocaine or 0.5 mg/kg of propofol two minutes prior to extubation. *Results*: Haemodynamic parameters like Systolic blood pressure, Diastolic blood pressure, Mean arterial pressure, Heart rate were recorded at the following intervals. At induction, at the end of surgery, injection of study drug, 2 minutes after injection of study drug, at extubation, 1 minute after extubation, 2 minutes after extubation and 5 minutes after extubation. Patients who did not receive either of the study drugs showed a significant rise in all the haemodynamic parameters at extubation. In patients who received either of the study drugs the increase in haemodynamic variables were significantly less, thus attenuating the haemodynmic response. No side effects were noted with propofol. *Conclusions*: It establishes the usefulness of an intravenous bolus dose of propofol 0.5 mg/kg to attenuate the haemodynamic response to extubation. Propofol 0.5 mg/kg is superior to lignocaine 1 mg/kg in prophylaxis of extubation response.

Keywords: Propofol; Lignocaine; Extubation.

Introduction

There are certain more stressful situations for the patient under general anaesthesia as regards induction, intubation and extubation. These periods have to be effectively dealt with, failing which the patient may be at great risk for hypertensive episodes and sequelae. These manouvers constitute a period of intense stimulation to the patient which can adversely affect the previously compromised cerebral and coronary circulations [1-7].

Tracheal intubation and extubation is accompanied by raised sympathoadrenal activity with an increased plasma catecholamine concentration.

Most episodes of myocardial ischemia occur during intubation and extubation and these ischemic events have been proven to have a causal relationship to post operative myocardial infarction, in those patients groups including hypertensive, whether treated or untreated, Diabetic, Atherosclerotic, Aneurysmal and so on. Consistent and reliable protection against rise of heart rate and blood pressure during extubation has been aimed at by using propofol in this study.

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Materials and Methods

This study was conducted on seventy five adult male and female patients undergoing surgery under general anaesthesia. Patients belonged to ASA grade-1 and grade-11 informed consent was taken.

Inclusion Criteria

The patients age ranged between 20 - 46 years, Patients underwent procedures like Vaginal Hysterectomy, Abdominal Hysterectomy, Laparotomy, Laparoscopy , Vaginal Septum Excision, Ward Mayo Surgery, Appendectomy, LSCS.

Exclusion Criteria

History of respiratory problems, angina, palpitations, syncope., base line heart rate <60/min, base line systolic BP <100mmHg, treatment with Beta blockers, coronary artery disease, ECG abnormalities, hepatic , renal problems.

All patients were assessed clinically preoperatively and investigated to rule out any systemic disease.

Patients were randomly divided into three groups of 25 (n=25).

Group - I

Control group received saline 5 mil.

Group-II

Lignocaine group received 1 mg / kg of lignocaine.

Group -III

Propofol group received 0.5 mg / kg of propofol.

Patients were premedicated with 0.2 mg of Glycopyrrolate IM 30 min before surgery.

Anaesthesia was induced with thiopentone sodium 5 mg/kg and tracheal intubation was facilitated with 2 mg/kg suxamethonium. Anaesthesia was maintained with O_2 33% N, O 67% vecuronium as muscle relaxant and pethidine 1 mg / kg. Halothane was used intermittently to keep BP and HR within 80 - 120% of preoperative levels.

The arterial blood pressure was monitored with L & T non-invasive blood pressure automated monitor. The pulse rate was monitored by a Criticare pulse-oximeter. The heart rate was monitored with L & T ECG dynamic monitor in lead II.. After the end of surgery N_2O was discontinued and residual muscle relaxation was reversed with Neostigmine 0.05 mg / kg and atropine 0.02 mg / Kg IV. One minute later saline, verapamil or lignocaine were given I V. in respective groups. The trachea was extubated 2 minutes after the study drug was given . Pharyngeal suction was done just prior to extubation.

Recovery criteria followed were Opening eyes to command, Spontaneous breathing, Maintaining SaO_2 >94% and Hand grip strength. After extubation 100% O_2 by face mask was given for 5 minutes.

Results

From the study conducted the following observations were made. Systolic and diastolic blood pressure mean arterial pressure and pulse rate recorded at Preoperatively at PAC, at induction, at end of surgery, at injection of study drug, tTwo minutes after injection of study drug, at extubation, one minute after extubation, two minutes after extubation, five minutes after extubation.

Table 1: Demographic distribution

	Saline (N=25)	Propofol (N = 25)	Lignocaine (N=25)
Age (yrs.) 20-46	26	27 yrs. 9 months	28 yrs. 5 months
Weight-36-70 kgs.	52	51.4 kgs.	52.7 kgs.
Duration of Surgery (Minutes)	67	65	80

Table 2: Hemodynamic parameters recorded at pre anaesthetic evaluation

	Saline	Propofol	Lignocaine
Systolic blood pressure	128	131	130
Diastolic blood pressure	80	81	83
Mean arterial pressure	96	97	98
Pulse rate	96	100	95

The table 1 shows age, weight and duration of surgery in the three groups. The ranges for ages was 20 – 46 yrs. The ranges for weight was 36 – 70 kgs. There was no statistically significant difference.

The table 2 shows haemodynamic parameters recorded at pre anaesthetic evaluation.

Talbe shows mean values : There was no statistically significant difference in the three groups (p >0.05).

The Table 3 shows the haemodynamic parameters in control (Saline) and study groups (Propofol, Lignocaine) at the end of surgery and at study drug.

Values given are the mean. There was no statistically significant difference in the three groups ($p>0.05$). Values at the end of surgery were taken as basal values.

The Table 4 shows haemodynamic parameters in control (Saline) and study groups (Propofol, Lignocaine) at the end of surgery and two minutes later at injection of study drug.

Values given are the mean. There was no significant difference statistically in the three groups ($p > 0.05$). Values at end of surgery were taken as basal values.

The Table 5 shows peak haemodynamic values at extubation in the control and study groups. There was a rise from basal values in all the three groups. But rise was significantly low in propofol and lignocaine groups ($p<0.05$)

Table 3: Haemodynamic parameters in control (Saline) and study groups (Propofol, Lignocaine) at the end of surgery and at study drug

	Saline End of surgery	Study Drug	Propofol End of Surgery	Study Drug	Lignocaine End of Surgery	Study Drug
Systolic blood Pressure	133	134	136	137	136	137
Diastolic blood Pressure	84	84	88	89	87	90
Mean arterial Pressure	99	100	104	105	103	105
Pulse rate	106	107	109	112	108	114

Table 4: Haemodynamic parameters in control (Saline) and study groups (Propofol, Lignocaine) at the end of surgery and two minutes

	Saline End of surgery	2 mins after Study Drug	Propofol End of Surgery	2 mins after Study Drug	Lignocaine End of surgery	2 mins after Study Drug
Systolic blood Pressure	133	137	136	130	136	131
Diastolic blood Pressure	84	85	88	82	87	85
Mean arterial Pressure	99	102	104	98	103	97
Pulse rate	106	108	109	95	108	100

Table 5: Haemodynamic values at extubation in the control and study groups

Variables	Drug	At extuba-tion	1 min. Alter extuba- tion	2 mins, after extuba- tion	5 min. After extubation
Systolic Blood Pressure	Saline	147	139	135	134
	Propofol	135	129	128	127
	Ligno-caine	141	135	134	134
Diastolic	Saline	92	87	83	82
Blood	Propofol	84	81	80	81
Pressure	Ligno-caine	91	85	84	84
Mean	Saline	110	104	100	99
Arterial	Propofol	99	97	96	96
Pressure	Ligno-caine	108	102	101	101
Pulse	Saline	123	112	103	100
Rate	Propofol	99	90	88	85
	Ligno-caine	113	101	97	96

Discussion

Studies by Bidwai et al [8] have demonstrated that there is a rise in haemodynamic parameters during extubation. Extubation is associated with an increased catecholamine release. These increased haemodynamic variables cause an increase in the oxygen consumption of the myocardium (Braunwald) [9].

In those patients with a compromised coronary circulation these changes may prove deleterious. A note of importance should be added to the fact that the increase in rate is much more detrimental than an increase in pressure (Slogoff & Keats AS) [10,11]. All the indices that determine the delicate balance that exists between myocardial oxygen consumption and oxygen supply such as the double pressure product, the triple pressure product, the rate pressure co-efficient include the common variable determinants

of heart rate and blood pressure. In those patients with decreased intracranial an increase in pressure must be avoided. It was noted that the rise in variables were lesser in the propofol group in comparison with the lignocaine group.

Y. Eshak, A. Khalid, M.D., T.H. Bhatti [12], studied the effects of small doses of propofol (0.5 mg / kg) on tracheal extubation. They concluded that administration of propofol 2 minutes before tracheal extubation attenuates cardio vascular response to extubation. There are no studies comparing lignocaine to propofol in their prophylactic role on extubation haemodynamics [13,14,15].

Our present study is consistent with the above studies in the role of attenuation of haemodynamic responses by intravenous lignocaine 1 mg/kg and propofol 0.5 mg/kg given 2 minutes before extubation. Our study concludes that propofol 0.5 mg/kg is a better prophylactic than lignocaine 1 mg/kg. Although the precise mechanism responsible for the haemodynamic changes during extubation remain to be elicited many types of stimuli such as emergence, wound pain may alter the haemodynamics. The effectiveness of propofol in attenuating these haemodynamic changes is related to its vasodilating effect and negative inotropic properties. While the ability of propofol to obtund laryngeal reflexes accounts for smooth emergence from general anaesthesia. It has a rapid onset of action and short duration.

Lignocaine is a membrane stabilizer, a class I b (one b) antiarrhythmic which has effects on the cardiovascular system. Previous studies have analysed the role of lidocaine in attenuating the responses to extubation. In our study the haemodynamic values at the end of surgery and at the administration of the study drug among the three groups did not show any significant variation.

Conclusions

Haemodynamic parameters like Systolic blood pressure, Diastolic blood pressure, Mean arterial pressure, Heart rate were recorded at the following intervals. At induction, at the end of surgery, injection of study drug, 2 minutes after injection of study drug, at extubation, 1 minute after extubation, 2 minutes after extubation and 5 minutes after extubation. Patients who did not receive either of the study drugs showed a significant rise in all the haemodynamic parameters at extubation. In patients who received either of the study drugs the increase in haemodynamic variables were significantly less, thus attenuating the haemodynmic response. No side effects were noted with propofol. In conclusion there was a rise in haemodynamic variables in all the three groups at extubation. The rise was less in the groups where lignocaine and propofol were administered.

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