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RESEARCH ARTICLE

EFFICACY OF NIFEDIPINE ON CARDIO- VASCULAR RESPONSE DURING LARYNGOSCOPY AND INTUBATION

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ABSTRACT

Background: The procedure of laryngoscopy and intubation is an integral part of modern day balanced anaesthesia. It is also the most delicate phase in general anaesthesia. It is performed for most major and some minor surgical procedures. The procedure of direct laryngoscopy and intubation is associated with significant haemodynamic changes such as increased heart rate, arterial pressure and dysarrhythmias in most patients (REID LC ct al 1940). Unfortunately these changes are often overlooked during anaesthesia as the anaesthesiologist may be much engaged in the intubation procedure and he has little opportunity to note any abnormal circulatory reactions. There exists an ongoing search for an ideal agents for attenuating cardiovascular responses to laryngoscopy and intubation. The aim of the present study was to see the effect of sublingual Nifedipine to reduce the adverse effects of intubation and laryngoscpy. We did a comparartive study in 40 normal healthy individuals undergoing surgery under general anaesthesia in our hospital. We divided patients in 2 groups (A & B) of 20 each. **GROUP A:** Patients received premedication only and formed the control group. **GROUP B:** Patients received 10mg. Nifedipine sublingual 20 minutes before induction. Baseline parameters were recorded in operation room e.g. pulse rate (PR), Blood Pressure – systolic (SBP) and diastolic (DBP),Mean Arterial Pressure (MAP),SPO_2 % and E.C.G. The readings were recorded at the following intervals:

-Just before giving drugs (baseline values, B.V)
-After giving drugs (before induction, B.I)
-After induction, (A.I)
-Just after laryngoscopy and intubation, (L&I)
-Post intubation at 1st (I_1), 3rd (I_3), 5th (I_5), 10th (I_{10}), 15th (I_{15}) and 30th (I_{30}) minute's interval. After completion of the study observations were tabulated, qualitatively and quantitatively analyzed using proper statistical methods.

Results: Sublingual Nifedipine given 20 minutes before induction effectively attenuated the increases in blood pressure but caused significant tachycardia which was further exaggerated following laryngoscopy and intubation.

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INTRODUCTION

The procedure of laryngoscopy and intubation is an integral part of modern day anaesthesia. It is the most delicate phase in general anaesthesia. The laryngoscopy and intubation is associated with significant haemodynamic changes in heartarterial pressure and dysarrhythmias in like increase in heart rate, arterial pressure and dysarrhythmias inmost patients (REID LC ct al 1940). Unfortunately these changes are often overlooked during clinical anaesthesia because the anaesthesiologist may be engaged in other technical aspects of intubation.

This increase in pulse rate and blood pressure are usually transitory, variable and unpredictable and probably of no consequences in healthy individuals. But some patientsrequire careful hemodynamic control during laryngoscopy and intubation. The complications that occur include left ventricular failure (Masson 1946), myocardial ischemia (Editorial BJA 1969), cerebral hemorrhage (Davidson 1986) and even sudden death. These changes had been ascribed to be due to vago-vagal reflex or due to stimulation of cardiac response. Subsequently it has been postulated that these reflexes are mediated by increased sympathetic nervous system activity. This is reflected by an increase in the level of

circulating catecholamines especially noradrenalin. The stimulation of the sympathetic system occurs due to laryngoscope pressing the base of the tongue or lifting the epiglottis thus stimulating the mechanoreceptors in the proximal part of the trachea. Over the period of time various approaches have been advocated ranging from minimizing the duration of laryngoscopy (to less than 15 second) and the use of various pharmacological agents to reduce the extent of these potentially harmful responses. Lidocaine is the oldest and most widely used drug for the purpose of attenuating pharyngeal and laryngeal reflexes. It is particularly suitable for this purpose because of its rapid onset and short duration of action which is compatible with the duration of this pressor response. It is used topically as laryngotracheal spray or by intravenous route. Other drugs have been postulated for attenuation of these presser responses include intravenous narcotics like Fentanyl, Alfentanil (KAUTTO 1985) and various antihypertensive agents such as beta blockers (PYRS PROBERS C.et al 1971), ganglion blockers (SIEDLECKI 1975), central sympatholytics like clonidine (ORKO ct al 1987), calcium channel blockers, ACE inhibitors and peripheral vasodilators like nitroprusside and hydralazine (CURRAN 1975 KAMRAS 1986).None of these pharmacological agents have proved entirely satisfactory because the response may not be completely blocked or the method itself carries additional risks. Therefore, there exists an ongoing search for an ideal agents for attenuating cardiovascular response to laryngoscopy and intubation. The aim of the present study was to compare the hemodynamic effects of sublingual nifedipine in healthy normotensive patients during general anaesthesia and to study the hemodynamic and electrocardiographic changes of these patients during laryngoscopy and tracheal intubation.

MATERIALS AND METHODS

The study was conducted in Department of Anaesthesioloy of our hospital after approval by the hospital ethics committee on 40 normotensive ASA Grade I & II patients. Selected patients were of both sexes, 20-60 years old and of ASA Grade I & II only. All patients underwent a thorough preanaesthetic checkup. Following investigations were performed-Haemoglob in%, Blood Sugar, TLC, DLC, BT/CT, RFT,LFT, ESR, E.C.G, Chest X-Ray ,Urine R/M

Exclusion Criteria

The following patients were not included in the study:

- Uncooperative patients.
- Patient suffering from renal, hepatic or psychiatric illnesses.
- Patients with a history of hypertension, diabetes mellitus, bronchial asthma.
- Patient on medication with any cardio –vascular diseases.
- Patient with addiction to any drugs particularly narcotics.

Pre-medication: Uniform premedication was given in both groups with tablet diazepam 5 mg H.S. on the night before surgery and with Inj pethidine 1 mg /kg and Inj Phenergan 0.5 mg / kg I.M. 45 minutes before induction of general an aesthesia.

Group A: Patients in this group only received the premedication and formed the control group.

Group B: Patients received 10mg. Nifedipine sublingual 20 minutes before induction.

Induction and maintetance of anaesthesia: Baseline parameters were recorded in operation room. The patients were preoxygenated for 3 minutes with 100% oxygen. Induction was done with inj. thiopentone sodium (3-5 mg/kg) I/V followed by injection succinylcholine (1.5 mg / kg) I/V. Endotracheal intubation was carried out and maintained with oxygen, nitrous oxide and injection vecuronium (0.08 to 0.1 mg /kg) I/V with Bain's or closed circuit.At the end of surgery reversal was done with injection atropine 0.02mg /kg and injection neostigmine 0.05mg / kg I/V.

Following parameters were observed for the study

- Pulse rate (PR)
- Blood Pressure – Systolic(SBP) and Diastolic (DBP)
- Mean Arterial Pressure (MAP)
- SPO_2 %
- E.C.G

The readings were recorded at the following intervals

- Just before giving Nifedipine(baseline values, B.V.)
- After giving drugs Nifedipine sublingually. (before induction, B.I.)
- After induction, (A.I.)
- Just after laryngoscopy and intubation, (L&I)
- Post intubation at 1^{st} (I_1), 3^{rd} (I_3), 5th (I_5)·10^{th} (I_{10}), 15^{th} (I_{15}) and 30^{th} (I_{30}) minutesintervals.
- Adverse effects if any were recorded. All the above information was recorded in a proforma.

Observations

The present study was conducted in 40 patients of both sexes, age group 20-60 yrs., scheduled for elective surgery under general anaesthesia at Rama Medical College Hospital & Research Centre, NH-24, Pilkhuwa, Hapur.In Group A(Control) the rise in mean pulse rate was statistically highly significant after induction, at laryngoscopy and intubation, 1 & 3 minutes post intubation and was significant at 5 & 10 minutes post intubation. While at other intervals the changes were statistically nonsignificant. In Group B (sublingual Nifedipine) the rise in means pulse rate was statistically significant as compare to the basal value, after administration, induction, laryngoscopy and intubation which progressed to a highly significant increase at 1& 3 minutes post intubation followed by a significant increase at 5&10 minutes post intubation.

While at other intervals the changes were statistically nonsignificant. In GROUP A (control) the rise in mean systolic blood pressure was highly significant after laryngoscopy and intubation and at 1min. post intubation and significant at 3 & 5 min. post intubation. In GROUP B (sublingual Nifedipine) the fall in mean systolic blood pressure after induction was significant while increase at 1 min. post intubation was highly significant. In GROUP A (control) there was a highly significant increase in the mean diastolic blood pressure at 1 & 3 minutes post intubation and significant increase subsequent to laryngoscopy, intubation and at 5 minutes post intubation.

Table 1. Distribution of patients

S. No.	GROUP	No. of Patient	Dose of drug
1	A	20	Control group
2	B	20	Sublingual Nifedipine

Table No.2. Age distribution

S. No	Age Group	Group A	Group B	Total
1	20-30	10	9	19
2	31-40	8	4	12
3	41-50	1	7	8
4	51-60	1	0	1
	TOTAL	20	20	40

Table no. 3. Sex distribution

S. NO.	GROUP	NO. OF PAT.	SEX	
			MALE	FEMALE
1	A	20	4	16
2	B	20	8	12
	TOTAL	40	12	28

Table No. 4. Weight Distribution

S. No	WEIGHT	GROUP A	GROUP B	TOTAL
1	30-40	3	3	6
2	41-50	8	5	13
3	51-60	5	8	13
4	> 61	4	4	8
	TOTAL	20	20	40

intubation, andat 3 minutes post intubation and was highly significant at 1min. post intubation. In GROUP A the increase in mean arterial blood pressure from basal was observed which was significant at laryngoscopy, intubation, and 5 min post intubation and highly significant at 1 & 3 min post intubation. In GROUP B there was a significant decrease in mean arterial blood pressure after induction and a highly significant increase at 1 & 3 min post intubation respectively.

ECG changes: Sinus tachycardia was seen in all cases and no other abnormality was seen in ECG throughout the study.

SPO_2 Changes: In all the cases SPO_2 was 95 % or more throughout the study.

Complication: No adverse effect of any drug and no complication was observed in the study.

DISCUSSION

The most vital element in providing safe anaesthesia is the maintenance of a patent airway. Laryngoscopy and endotracheal intubation is the routinely performed procedure to ensure an intact airway and hence form an integral part of modern day balanced anaesthesia.The aim of the present study was to compare the hemodynamic effects of sublingual Nifedipine in healthy normotensive patients during general anaesthesia and to study the hemodynamic and electrocardiographic responses to laryngoscopy and tracheal intubation.

Table No. 5. Mean pulse rate in two groups at relevant recording time

Group		B.V.	V.I.	A.I.	L&I	I_1	I_3	I_5	I_{10}	I_{15}	I_{30}
A(Control)	Mean	87.05	87.05	99.95	103.65	119.65	109.05	100.40	98.85	89.75	87.55
	S.D	7.69	7.69	5.51	5.82	9.03	9.81	5.91	5.40	5.50	5.61
B(Sublingual(Nifedipine)	Mean	88.55	95.70	98.95	102.50	109.60	101.35	93.10	93.00	90.20	88.50
	S.D	14.68	14.41	14.75	15.05	15.56	16.07	13.97	11.85	14.21	14.65

Table No. 6. Statistical analysis of mean pulse rate in two groups at relevant recoding time and their comparison with baseline value

Group		B.V-B.I	B.V-A.I	B.V-L&I	B.V-I_1	B.V-I_3	B.V-I_5	B.V-I_{10}	B.V-I_{15}	B.V-I_{30}
A (Control)	P. Value	--	<0.00	<0.00	<0.00	<0.00	<0.05	<0.05	>0.05	>0.05
	Significance	--	H.S.	H.S.	H.S.	H.S.	S.	S.	N.S.	N.S.
B (Sublingual	P. Value	<0.05	<0.05	<0.05	<0.00	<0.00	<0.05	<0.05	>0.05	>0.05
Nifedipine)	Significance	S.	S.	S.	H.S.	H.S.	S.	S.	N.S	N.S

S=SIGNIFICANT, N.S. = NON SIGNIFICANT, H.S. = HIGHLY SIGNIFICANT

Table No. 7. Mean systolic blood pressure in two group at relevant recording time

Group		B.V.	B.I.	A.I.	L & I	I_1	I_3	I_5	I_{10}	I_{15}	I_{30}
A (Control)	Mean	128.80	128.80	127.30	139.40	165.40	145.00	134.30	130.30	129.10	127.70
	S.D	10.29	10.29	13.30	11.46	16.44	8.17	9.61	8.74	8.32	9.59
B(Sublingual	Mean	127.80	127.40	119.70	129.10	152.20	150.50	126.50	126.10	123.50	128.10
Nifedipine)	S.D	11.57	15.19	12.77	31.21	12.86	72.76	12.63	10.90	8.10	11.58

Table No. 8. Mean diastolic blood pressure in two groups at relevant recording time

Group		B.V.	B.I.	A.I.	L&I	I_1	I_3	I_5	I_{10}	I_{15}	I_{30}
A (Control)	Mean	77.50	77.50	76.50	81.95	96.40	87.50	81.70	79.40	76.30	75.30
	S.D	6.39	6.39	5.91	9.62	8.62	3.78	6.03	5.73	4.91	4.65
B(Sublingual	Mean	76.60	77.70	70.70	83.60	94.60	84.90	78.50	79.30	77.20	76.80
Nifedipine)	S.D	7.82	7.09	17.75	9.08	8.83	9.55	6.89	7.23	6.20	7.38

Table No.9. Mean of arterial blood pressure in two groups at relevant recording time

Group		B.V.	B.I.	A.I.	L&I	I_1	I_3	I_5	I_{10}	I_{15}	I_{30}
A(Control)	Mean	94.70	94.70	93.50	101.10	119.50	106.60	99.25	96.45	93.95	92.75
	S.D	6.83	6.83	7.19	9.54	10.25	4.03	5.73	5.38	5.16	5.77
B(Sublingual	Mean	93.65	94.15	86.95	98.65	113.75	106.75	94.50	94.75	92.60	93.90
Nifedipine)	S.D	8.54	8.89	14.62	14.52	9.65	26.51	7.55	6.73	5.88	8.21

Group A (Control): After induction there was a highly significant increase in PR, a non-significant decrease in the SBP, DBP and MAP. Just after laryngoscopy and intubation there was a highly significant increase in PR, SBP, DBP and MAP. At 1 min post intubation a highly significant increase was observed in all the parameters from the basal value.

At 3 min post intubation there was highly significant increase in PR, DBP, and MAP, though a decrease was seen in the SBP. It was still significantly higher than the basal value. At 5 minutes post intubation a gradual decline was seen in all the parameters with SBP, DBP and MAP reaching the basal value by 10 minutes post intubation and PR by 15 minutes post intubation.

Group B (Sublingual Nifedipine): After pre-treatment with sublingual Nifedipine a statistically significant increase was observed in the PR while the changes in the rest of the parameters from the baseline were non-significant.After induction there was a significant increase in PR while a statistically significant fall was observed in SBP and MAP and a non-significant increase was seen in DBP. Just after laryngoscopy and intubation there was a significant increase in PR, DBP while a non-significant increase in the rest of the parameters.

At 1 min post intubation there was a highly significant increase in all the parameters. At 3 minutes post intubation there was still a highly significant increase in the PR and a significant increase in DBP, MAP. At 5 minutes post intubation there was a persistent significant increase in PR while the rest of the parameters had decreased but were still higher than the basal value by a non-significant difference. Thereafter there was a non-significant change from the baseline in the rest of the recording at the remaining intervals.

RESULTS AND CONCLUSION

In the present study following conclusions are drawn:

- Laryngoscopy and intubation are associated with significant increases in pulse rate, blood pressure, mean arterial pressure and sinus tachycardia
- The maximum increases in parameters occur at 1 min post intubation with values returning to baseline at 10 min post intubation in case of pulse rate and at 5 minutes post intubation in case of systolic, diastolic and mean arterial pressure.
- The sublingual Nifedipine though effective in attenuating the degree of cardio vascular response but was not fully effective to decrease the response immediately after intubation.
- Sublingual Nifedipine given 20 minutes before induction effectively attenuated the increases in blood pressure but caused significant tachycardia which was further exaggerated following laryngoscopy and intubation.

The drug studied is helpful in attenuating other cardiovascular response to laryngoscopy and intubation without any complication except tachycardia when used in proper dosage and at a proper time.

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