



EFFICACY OF NITROGLYCERINE SPRAY ON CARDIOVASCULAR RESPONSE DURING LARYNGOSCOPY AND INTUBATION

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ABSTRACT Laryngoscopy during intubation is associated with significant increase in pulse rate and blood pressure. The present prospective randomized comparative study conducted at Rama Medical College Hospital and Research Centre, Pilkhuwa, Hapur aimed to assess the efficacy of Nitroglycerine spray 2 puffs (0.8mg) for attenuation of such hemodynamic stress response in patients undergoing laryngoscopy and intubation for general anaesthesia for major operation who were compared to patients receiving premedication only. The study found that the use of Nitroglycerine spray(0.8%) administered intranasal 2 minutes before induction is associated with statistically significant blunting of the hypertensive effect but not the tachycardia response of the cardiovascular system to laryngoscopy and intubation while under G.A.

KEYWORDS : Nitroglycerine, General Anesthesia, Laryngoscopy and Intubation.

INTRODUCTION

The procedure of laryngoscopy and intubation is an integral part of modern day balanced anesthesia. It is performed for most of the major and some minor surgical procedures. The procedure of direct laryngoscopy and intubation is associated with significant hemodynamic changes such as increase in heart rate, arterial pressure and dysarrhythmias in up to 90% of the patient (REID LC et al 1940). Unfortunately these are often overlooked during clinical anesthesia as the anesthesiologist may be so engaged in the technical aspects of intubation that he has little opportunity to note any abnormal circulatory reaction unless it is severe or prolonged.

Transient hypertension and tachycardia are probably of no consequence in healthy individuals but some patients unquestionably require careful hemodynamic control during anesthesia and intubation of the trachea. Mostly these are patient with known or suspected ischemic heart disease, recent myocardial infarction and those with hypertension. The complications that may occur because of this sudden rise in blood pressure include left ventricular failure (Masson 1946), myocardial ischemia (Editorial BJA 1969), cerebral hemorrhage (Davidson 1986) and even sudden death.

These cardiovascular changes had initially 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 noradrenaline. 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 that have been postulated for attenuation of these pressor 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 et al 1987), calcium channel blockers, ACE inhibitors and peripheral vasodilators like nitroprusside and hydralazine (CURRAN 1975 KAMRAS 1986). None of these pharmacological approaches has proved entirely satisfactory because the response may not be completely blocked or the method itself carries some additional risk. The agent used may have too long action or have unfeasible side effects.

Therefore, there exists an ongoing search for an ideal agent for attenuating cardiovascular response to laryngoscopy and intubation. The aim of the present study was to study the hemodynamic changes associated with induction of general anesthesia during laryngoscopy and endotracheal intubation, to evaluate the efficacy of 0.8mg of topical Nitroglycerine in the form of intra nasal spray in attenuating stress response during laryngoscopy and intubation and to observe for untoward reactions and adverse effects, if any.

MATERIAL AND METHOD

The study was conducted in Department of Anesthesiology and Critical Care, Rama Medical College Hospital and Research Centre, NH-24, Pilkhuwa, Hapur after approval by the hospital ethics committee on 40 normotensive ASA Grade I & II patients. All patients underwent a thorough pre-anesthetic checkup comprising of general physical examination, systemic examination and routine investigations. Other investigations were conducted whenever required. Uncooperative patients, patient suffering from renal, hepatic or psychiatric illness, 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 were excluded from present study.

After obtaining informed consent patients were randomly divided into 2 groups (A & B) of 20 each. Uniform premedication was done 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 anaesthesia. Patient in group A only received the premedication and formed the control group. Patients in group B received topical Nitroglycerine in the form of intra nasal spray in a dose of 0.8 mg. 2 minutes before induction. The drug was administered as 2 puffs of nitroglycerine spray each metered dose of which delivers 0.4 mg. nitroglycerine. 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 vecuraniun (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 glycopyrrolate 0.01mg/kg and injection neostigmine 0.05mg / kg I/V. Parameters like pulse rate (PR), blood Pressure – Systolic(SBP) and Diastolic (DBP), mean Arterial Pressure (MAP), SPO₂, E.C.G were observed for the study. The readings were recorded 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 (I₁), 3rd (I₃), 5th (I₅) 10th (I₁₀), 15th (I₁₅) and 30th (I₃₀) minute intervals. Adverse effects if any were recorded. All the above information was recorded in a Performa. After completion of the study observations were tabulated, qualitatively and

quantitatively analyzed using proper statistical methods.

OBSERVATIONS

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 non significant.

In Group B (Nitroglycerine Spray) the increase in mean pulse rate was statistically highly significant on laryngoscopy and intubation, at 1 minute post intubation and was significant at 3 minutes post intubation, while at other intervals the changes were non-significant.

Table No. 1:- 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 (Nitroglycerine Spray)	Mean	97.90	99.20	98.00	104.10	109.50	100.90	96.90	96.60	94.80	97.45
	S.D	14.73	14.12	25.23	12.34	11.57	11.52	12.22	11.70	12.08	14.27

Table No. 2:- 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(Nitroglycerine Spray)	P. Value	> 0.05	> 0.05	<0.00	<0.00	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05
	Significance	N.S.	N.S.	H.S.	H.S.	S.	N.S	N.S	N.S	N.S

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

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 (Nitroglycerine spray) the fall in mean systolic blood pressure after induction and at 1 minute post intubation respectively were both statistically highly significant.

Table No. 3:- 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(Nitroglycerine Spray)	Mean	136.50	136.00	126.30	134.30	148.80	138.80	134.90	134.00	134.70	135.20
	S.D	8.58	11.37	9.80	8.95	9.99	10.07	6.03	5.31	7.12	7.77

Table No. 4:- 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(Nitroglycerine Spray)	Mean	81.50	83.40	77.70	80.10	90.10	84.80	80.30	79.10	83.60	83.00
	S.D	5.39	5.70	4.99	5.33	5.29	6.07	5.36	4.42	5.13	4.47

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.

In GROUP B (Nitroglycerine spray) there was a significant fall in mean diastolic blood pressure after induction and at 3 minutes post intubation respectively, while at 1 minute post intubation the increase was highly significant as compared with the baseline value.

Table No.5:- 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(Nitroglycerine Spray)	Mean	99.80	100.85	93.95	98.30	109.65	102.65	98.45	97.40	100.65	100.45
	S.D	5.28	5.82	5.92	5.69	5.70	5.97	5.18	4.25	4.31	4.77

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 statistically highly significant decrease in mean arterial blood pressure after induction and significant increase at 1 & 3 minute post intubation respectively. Sinus tachycardia was seen in all cases and no other abnormality was seen in ECG throughout the study. In all the cases SPO₂ was 95 % or more throughout the study.

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 procedure of laryngoscopy and intubation is associated with significant hemodynamic changes and attenuation of these has attracted the attention of anesthetists for more than half a decade. The reason for this is an occasional sudden death following intubation, tachycardia, hypertension and arrhythmias. These cardiovascular changes though transient may be potentially dangerous especially in hypertensive patients and in patients with coronary and cerebral vascular insufficiency. Over the period of time various

approaches have been advocated, ranging from minimizing the duration of laryngoscopy to less than 15 seconds to the use of various pharmacological agents but none has been found to be ideal alone so far. Therefore the pursuit of an ideal agent for the suppression of cardiovascular response to intubation without altering the normal physiology continues.

The aim of the present study was to compare the hemodynamic effects of nitroglycerine spray in healthy normotensive patients during general anesthesia and to study the hemodynamic and electrocardiographic responses to laryngoscopy and tracheal intubation.

In group A (CONTROL GROUP), 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.

In group B (NITROGLYCERINR SPRAY), after pre-treatment a statistically non-significant changes were observed in all the recorded parameters. After induction a statistically non-significant increase was observed in PR while there was a highly significant decrease in SBP & MAP and a significant decrease in DBP. Just after laryngoscopy and intubation there was a statistically highly significant increase in PR and a steady rise in the rest of parameters which was statistically non-significant. At 1 minute after laryngoscopy and intubation statistically highly significant changes occurred in all the parameters from the baseline value. At 3 minutes post intubation PR, DBP and MAP remained above the basal value and were statistically significant while SBP increased from the baseline and it was non-significant. At 5 minutes post intubation all the parameters had reached the baseline value and non-significant changes were observed in all the recorded parameters.

CONCLUSION

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. Nitroglycerine spray administered intranasal 2 minutes before induction effectively attenuate the hypertensive effect but not the tachycardia response of the cardiovascular system to laryngoscopy and intubation under G.A. The drug studied is helpful in attenuating the hypertensive effect of cardiovascular system to laryngoscopy and intubation but not very effective in attenuating the tachycardia response when used in proper dosage and at a proper time.

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