

ORIGINAL RESEARCH

Attenuation Of Rise In Blood Pressure And Heart Rate During Direct Laryngoscopy And Intubation

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ABSTRACT

Introduction: During laryngoscopy and intubation rise in blood pressure, heart rate and cardiac arrhythmias occurs. The aim of present study was to attenuate rise in blood pressure and heart rate due to laryngoscopy and intubation with Metoprolol and Nitroglycerin.

Materials and Methods: Sixty patients undergoing surgeries were divided into three groups. Group A- Control group, Group B- Metoprolol 2 mg IV. Group C- Nitroglycerin 1mg sublingually. Parameters which were assessed are systolic blood pressure, diastolic blood pressure and heart rate. Measurements were done at base line, 5 minutes after receiving drug, one and five minutes after induction, one and five minutes after laryngoscopy and intubation. The statistical analysis was done using ANOVA and Tukeys HSD Post hoc test.

Results: Both drugs significantly attenuated the rise in systolic blood pressure during laryngoscopy and intubation. Metoprolol was more effective in reducing heart rate and diastolic blood pressure.

Conclusion: Attenuation of pressure responses were present in both Metoprolol and Nitroglycerin. Out of the two Metoprolol can be used to attenuate hemodynamic response during laryngoscopy and intubation and reinforces the notion that pharmacological treatment with beta blockers is a safe and effective method.

Keywords: Laryngoscopy and intubation, Nitroglycerin, Metoprolol.

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INTRODUCTION

During general anaesthesia laryngoscopy and intubation are often accompanied by elevation of blood pressure, heart rate and dysrhythmia.^{1,2,3} This occurs due to reflex afferent stimulus of sympatho-adrenergic response. These reflex changes are of little significant in normal healthy patients but may be dangerous in cases of coronary artery diseases, raised intra cranial pressure, intracranial aneurysm, partial or complete heart block and hypertensive patients. Various techniques and agents has been used to attenuate this sympatho-adrenergic response including fibre optic bronchoscopy, deep anaesthesia and pharmacological agents.^{4,7} In this study Metoprolol and Nitroglycerin has been used to attenuate the pressure response due to laryngoscopy and intubation in normotensive patients. Metoprolol is a cardio-selective beta1 Blocker. Metoprolol decreases heart rate, force of contraction and cardiac output. It decreases automaticity, rate of diastolic depolarisation of ectopic foci, delays A.V conduction. It has been found to reduce incidence of arrhythmia perioperatively.⁸ Nitroglycerin is routinely used to control blood pressure perioperatively and reduce blood loss during anaesthesia.^{9,10} It causes direct nonspecific smooth muscles relaxation. The purpose of this study was to evaluate the efficacy of Metoprolol and Nitroglycerin in controlling the hemodynamic response to laryngoscopy and intubation.

MATERIALS AND METHODS

The study was conducted in a tertiary care teaching hospital in north India (SRMSIMS, Bareilly, India). The study was conducted on sixty patients of either sex belonging to ASA grade I and II requiring general anaesthesia for elective surgeries. The patients were normotensive and without any history of cardiovascular, cerebrovascular or peripheral vascular diseases and not taking any medication for past 4 weeks. Institutional ethics committee approval and written informed consent was taken. The patients who volunteered to participate in the study were divided in three groups.

Group A – Total number of patients studied – 20. This group was considered as control group.

Group B – Total number of patients studied-20. Patients were given Metoprolol 2 mg IV, 5 minutes before induction of anaesthesia.

Group C – Total number of patients studied – 20. Patients were given Nitroglycerin 1mg sublingually, 2 minute before induction of anaesthesia.

Before subjecting the patients for the study, thorough clinical examination was done and laboratory investigations were examined. Indication for surgery was noted and written consent was taken. All the patients were premedicated with 0.01 mg/kg Glycopyrrolate and 1 mg/kg Chlorphenamine maleate, IM 30 minute before surgery. IV line was secured using DNS/RL and preoxygenated for 5minutes. Anaesthesia was induced with Thiopentone sodium 4-7 mg/kg, over 20 seconds. When eye-lash reflex was abolished Suxamethonium 1-2 mg/kg was given. When fasciculations due to Suxamethonium were disappeared patients were intubated with cuffed lubricated (with lignocaine 2% Jelly) endotracheal tube. Parameters which were assessed are systolic blood pressure (SBP), diastolic blood pressure (DBP) and heart rate (HR). Measurements were done using at base line(T0), 5 minutes after receiving drug(T1), one minute induction (T2), five minutes after induction(T3), one minute laryngoscopy and intubation(T4) and five minutes after laryngoscopy and intubation(T5).

STATISTICAL ANALYSIS

Results were analyzed using one way ANOVA and Tukey HSD post hoc test. SPSS software version 17.0 was used for these purposes. 95% desired confidence interval has been taken for calculation of significance. Actual p values are given to show the differences.

RESULTS

There were no significant differences in baseline characteristics of all three groups of patients viz. age, gender, weight, height and BMI. There was no significant difference in three groups regarding blood pressure and heart rate (Table1).

Characteristics	Gr A	Gr. B	Gr. C	p value
Age(yrs)	54.68 ± 6.8	55.74 ± 7.5	54.43±7.8	0.9153
Gender (Male)	6 (60%)	5 (50%)	6(60%)	
Weight (Kg)	63.87 ± 5.86	62.54 ± 5.73	64.65± 6.24	0.7276
Height (cm)	163.74 ± 5.54	168.84± 6.02	165.25± 5.84	0.1499
BMI (kg/m ²)	23.8 ± 2.13	21.9 ± 1.19	23.7±2.43	0.0727

Table-1: Showing baseline characteristic of three group of patient.

The outcome measure has been given in table (Table 2) and summarised below-

Group A (Placebo) Vs Group B (Metoprolol)

Metoprolol significantly reduced the systolic blood pressure, diastolic blood pressure and heart rate as compared to placebo at the time of induction and 5 minute after induction. It also reduced the systolic blood pressure as compared to placebo after giving the drug and at the time of induction. But it failed to significantly reduce the diastolic blood pressure after giving the drug and at induction.

Group A (Placebo) Vs Group C (Nitroglycerin)

Nitroglycerin significantly reduced the SBP andDBP at the time of intubation and at induction. No significant difference was detectable five minutes after intubation. It didn't significantly reduced the heart rate at any time point.

Group B (Metoprolol) Vs Group C(Nitroglycerin)

	T0	T1	T2	T3	T4	T5
Systolic blood pressure						
Gr A	126.8±3.19	124.8±3.17	120.37±2.37	103.35±4.05	146.27±5.88	117.92±3.81
Gr B	124.8±3.55	112.43±3.47	108.42±2.75	92.03±2.72	110.89±3.30	105.08±3.38
Gr C	132.63±2.31	110.9±2.67	109.57±3.04	95.5±2.92	120.64±5.02	120.93±3.65
p value						
Among Gr.	0.19	0.01	0.01	0.06	0.0001	0.01
Gr A Vs Gr B		0.02	0.01		0.0001	0.05
Gr A Vs Gr C		0.01	0.02		0.0025	0.83
Gr B Vs Gr C		0.94	0.95		0.3448	0.01
Diastolic blood pressure						
Gr A	84.5±2.74	76.87±2.72	77.85±2.51	60.89±2.50	90.76±2.93	80.84±2.76
Gr B	79.34±3.05	69.85±2.52	71.05±2.52	58.65±2.83	72.54±3.24	64.23±3.12
Gr C	82.64±2.80	68.90±1.99	68.87±1.91	60.80±1.86	81.78±3.16	69.79±2.61
p value						
Among Gr.	0.45	0.06	0.03	0.7637	0.001	0.001
Gr A Vs Gr B		0.12	0.12		0.001	0.001
Gr A Vs Gr C		0.07	0.03		0.027	0.122
Gr B Vs Gr C		0.96	0.79		0.109	0.363
Heart rate						
Gr A	86.97±3.30	88.01±3.47	86.89±4.01	84.78±3.98	96.89±4.82	83.79±3.61
Gr B	85.69±3.46	76.6±2.26	75.87±2.49	68.84±2.27	78.81±3.00	68.83±2.88
Gr C	84.07±3.55	86.14±3.82	84.9±5.33	88.86±4.86	82.87±5.14	72.77±4.03
p value						
Among Gr.	0.84	0.04	0.15	0.003	0.02	0.02
Gr A Vs Gr B		0.05		0.018	0.02	0.02
Gr A Vs Gr C		0.91		0.737	0.08	0.09
Gr B Vs Gr C		0.11		0.003	0.79	0.71

There was no significant difference in SBP, DBP

Table-2: Showing SBP, DBP & HR at different time points. The values are given as Mean±SEM. ANOVA has been used to detect any intergroup differences among groups and Tukey post hoc test has been used to analyse any intergroup differences. (T0= Baseline; T1= Five minutes after giving drug; T2= One minute after induction; T3= Five minutes after induction; T4= One minute after laryngoscopy and induction; T5= Five minutes after laryngoscopy and induction)

and HR at the time of intubation and five minutes after intubation.

DISCUSSION

Hemodynamic changes begin within seconds of direct laryngoscopy and there is a further increase in heart rate and blood pressure with passage of the tracheal tube. The magnitude of the response depends upon the stress during the manoeuvre and is subject specific. Generally these changes

are transient returning to base levels within five minutes, but they can result in myocardial ischemia in patients with cardiac disease. Several measures are taken to minimize the sympathetic response owing to endotracheal intubation. These include avoiding oro-pharyngo-laryngeal stimuli, deep anaesthesia and pharmacological intervention. These effects can be blunted by increasing the depth of anaesthesia but changes in the concentration of anaesthetic agents in blood and at effector sites occur slowly in comparison to airway stimuli and hemodynamic responses.

The primary goal of this intervention was to determine whether Metoprolol and Nitroglycerin will be able to attenuate this response. The result of this study suggests that Metoprolol was able to suppress the hemodynamic changes during laryngoscopy and intubation. Nitroglycerin was able to reduce some of the parameters viz. SBP and DBP during intubation but failed to significantly reduce HR and blood pressure five minutes after intubation. Issursingh R M et al.¹¹ has reported Metoprolol significantly reduced the rise in Systolic and diastolic blood pressure as well as heart rate compared to control group during laryngoscopy and intubation. They reported that a mean increase of SBP by 15.6 mmHg occurred at intubation in the Metoprolol group as compared to 41.4 mmHg control group. The SBP and heart rate (HR) in Metoprolol group returned to normal by the 3rd minute after intubation while it remained significantly elevated ($p < 0.001$) in control group till 4 minutes after intubation. Gurudatta K N et al.¹² reported change in mean heart rate one minute post intubation of 4.24(5.08%) in Metoprolol group which was significantly less than placebo 37.96(45.46%, p -value <0.05). Similarly the rise of SBP and MAP was also significantly reduced in Metoprolol group compared to Placebo. Reddy S V et al.¹³ Has reported that Esmolol a short acting beta blocker decreased heart rate but did not significantly reduced SBP compared to placebo. Singh H et al.¹⁴ has reported that there was no significant difference between Nitroglycerin and placebo with respect to MAP and heart rate .

CONCLUSION

Our study corroborates findings from other similar studies and reinforces the notion that pharmacological intervention can be employed to attenuate the hemodynamic response during laryngoscopy and intubation. A beta blocker such as Metoprolol can confer some additional benefit owing to its anti arrhythmic and cardio-protective property. In conclusion this study demonstrated that Metoprolol can be safely used to attenuate hemodynamic responses induced during laryngoscopy and intubation.

LIMITATIONS

A larger randomized control trial is needed to detect actual benefit in patients. Further laryngoscopy and intubation depends upon the skill of anaesthesiologist and a skilled anaesthesiologist can limit the hemodynamic response by minimising the time and stress in endotracheal intubation. Finally the long-term consequences and effect on morbidity and mortality of the intubation response in different surgical population groups is yet to be seen. Therefore the benefit of attenuating this response in all patients is not clear.

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