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ATTENUATION OF HEMODYNAMIC RESPONSE TO LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION WITH PRE INDUCTION NITROGLYCERINE (NTG) SUBLINGUAL SPRAY IN NORMOTENSIVE AND HYPERTENSIVE PATIENTS

Anesthesiology

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ABSTRACT

Tracheal intubation is as important part of general anaesthesia. The purpose of this paper to evaluate haemodynamic responses to tracheal intubation occurring in normotensive and hypertensive patients and to evaluate efficacy of NTG spray for attenuating haemodynamic response in normotensive & hypertensive patients in comparison to control cases .This study consider 120 patient undergoing general anaesthesia with trachel intubation divided into two groups of 30 patients each - 50% receiving NTG spray and 50% not receiving NTG the spray by chit block method using groups of 20 chits. This study concluded that, Sublingually administered nitroglycerin spray in a dose of 0.8 mg of two puff(400 µg /spray) prior to intubation is an effective in attenuate haemodynamic response to tracheal intubation.

KEYWORDS

Nitroglycerine, Normotensive, Hypertensive, Tracheal intubation

Introduction

Tracheal intubation is as important part of general anaesthesia and is associated with increase in haemodynamic response1,2. The haemodynamic changes during tracheal intubation occur due to reflex sympathetic discharge caused by epipharyngeal and laryngopharyngeal stimulation. This increase in sympathoadrenal activity may result in hypertension, tachycardia and arrhythmias1. This increase in blood pressure and heart rate are usually transitory, variable and unpredictable. It is more hazardous in a patient with hypertension, myocardial insufficiency or cerebrovascular diseases1,3,4. Therefore, attenuation of this haemodynamic responses to tracheal intubation such as hypertension, tachycardia and arrhythmias is important for an anesthesiologist. During intubation we have limited options, as the agents to be used to attenuate haemodynamic response. Therefore sometimes intravenous agents like esmolol, lignocaine and diltiazem which fulfill these criteria are used in patients who are likely develop hypertension at the time of extubation1,5. The non pharmacological methods like, smooth and gentle intubation, blocking the glossopharyngeal nerve and superior laryngeal nerve have been used to attenuate the cardiovascular responses to tracheal intubation. None of these above mentioned approaches have been proved entirely satisfactory. All of them require time for preparation and administration. Hence, the search for an ideal agent to attenuate the haemodynamic responses is still continuing. Intravenous NTG is used since many years for

attenuating raised blood pressure during intraoperative period. Intravenous or sublingual NTG has been used for attenuating hypertensive response during laryngoscopy, tracheal intubation6,7,8 & also for controlling hypertension during intubation while studying efficacy of other drugs.5,9,10 Nitroglycerine generate NO (Nitric oxide) in vascular smooth muscle which produce vasodilatation leading to decrease in blood pressure.11,12,13 Nitroglycerin has been also found to relax tracheal and bronchial smooth muscle and hence it has been used to prevent laryngospasm by some anaesthesiogists. NTG sublingual spray is a simple, easy to use formulation mainly aimed for treatment of acute anginal episodes Hence the present randomized, controlled study was undertaken to evaluate effects of sublingual nitroglycerin spray given prior to neuromuscular blockade on tracheal intubation response in normotensive & hypertensive patients.

Materials and methods

In this randomized controlled study efficacy of NTG sublingual spray on tracheal intubation response was evaluated in 120 ASA I & II normotensive and hypertensive patients, who had undergone elective surgery under general anaesthesia with tracheal intubation.

A Complete preoperative assessment was carried out with particular attention to haemodynamic parameters and relevant investigations were checked. Written informed consent was taken from those who were willing to participate in study. Sixty normotensive patients and 60 hypertensive patients were included in study.

A patient was considered hypertensive if-

1) Known hypertensive on regular antihypertensive treatment or
2) At least 2 readings of blood pressure exceeding 140/90 mm of Hg during preoperative hospitalization period.

Both these types of patients were randomly subdivided into two groups of 30 patients each - 50% receiving NTG spray and 50% not receiving NTG the spray by chit block method using groups of 20 chits.

After the patient was taken on OT table, a multipara monitor was attached, blood pressure, heart rate and SpO2 were checked & noted. Intravenous (IV) access was obtained. A standard anaesthesia technique was used for all patients. Intravenous Premedication with, Inj. Glycopyrrolate 0.004 mg/kg, inj. Ondensetron 4 mg, Inj. Midazolam 0.02 mg/kg IV, Inj. Fentanyl 2 µg/kg, were given to all patients. After preoxygenation, anaesthesia was induced with Sodium Thiopentone 6 mg/kg IV, neuromuscular blocking agent Succinylcholine 2 mg/kg IV, were given. Under direct laryngoscopic vision intubation was performed, tube was secured, confirmed & fixed.

Anaesthesia was maintained on O2 + N2O + intermittent vecuronium + Sevoflurane inhalation. Haemodynamic parameters i.e. heart rate, blood pressure, O2 saturation, and etco2 were monitored throughout surgery and were maintained within 80-120% of baseline values by adjusting the sevoflurane dial flow and fentanyl boluses. Hemodynamic parameters were recorded every 2 minutes from time of laryngoscopy.

All Patients were extubated when respiration was adequate, the patients obeyed verbal commands and other general extubation criteria were fulfilled.

After extubation heart rate, systolic blood pressure diastolic blood pressure & O2 saturation were noted after every 2 minutes for 10 minutes [0, 2, 4, 6, 8, 10] then after every 5 minutes [15, 20, 25, 30 minutes] in all patients. Incidences of any arrhythmias, ischaemia or any other side effects or complications were noted. Patients were kept in postanaesthesia care unit for two hours and then followed up in post operatively period for any side effects or adverse events.

Observations and results

Sixty normotensive patients were divided into two groups of 30 each. A

group (n=30) received sublingual nitroglycerine spray before reversal of neuromuscular blockade after surgery where as Group B (n=30) served as control and did not receive the NTG spray. Similarly, 60 hypertensive patients were also divided randomly to group C (n=30) receiving NTG spray and Group D (n=30) not receiving the spray.

Variations in mean heart rates at various times are depicted in table 1. Mean baseline heart rate was 83.5±12.17 per minute in the A group and 86.70±13.11 per minute in the B group, which were comparable and the difference was not significant ($p>0.05$).

The maximum rise in heart rate was noted at the time of intubation in the B group. However at both these times, the difference between the groups was not statistically significant. ($p>0.05$)After that, a gradual decrease was noted in both the groups and after 10 minutes of intubation, the difference from baseline was clinically non significant. There was no significant difference ($p>0.05$) between the two groups.

In group C maximum mean systolic pressure was noted at 1 minute after NTG spray. Thereafter the pressure started coming down rapidly to baseline values by 3rd minute after NTG spray. In group D maximum mean systolic pressure was at 1 minute after starting reversal agent. Thereafter the pressure started coming down returned to near baseline values by 8 minutes after intubation in D group.When this data was compared before, in group C statistically significant decrease in systolic blood pressure was noted after 2 minutes of NTG spray. Statistical evaluation between the groups showed that systolic arterial blood pressure was statistically significantly lower from 3 minutes after NTG spray till 8 minutes after in tubation ($p<0.05$) in group C, when compared to change in systolic arterial blood pressure in Group D.

Discussion

Nitroglycerine is a commonly used intravenous agent in treatment of hypertension during anaesthesia NTG sublingual spray is having faster onset of action (2-3 minutes), higher peak response, shorter duration of action, no need to prepare and is easy to administer as compared to any other preparation. The half-life of 4-5 minutes gives us a convenient alternative.

The basic idea of using any drug for attenuating the hypertensive response to tracheal extubation is that its peak effect should correspond to that of the stimulus. A 2-3 minute time gap is needed between administration of NTG sublingual spray and tracheal intubation as done in the present study, as this time interval was found to be satisfactory after preliminary clinical trials. Thus the choice of the drug, route of administration and the timing used in present study seem to be justified. Though wide range of doses of NTG are used to control blood pressure(0.3-0.5mg), satisfactory blood pressure control has been observed with 0.8-1.2 mg sublingually or intranasally and hence, the current dose of 0.8 mg was used in the present study.

Significant increase in heart rate, systolic blood pressure, diastolic blood pressure, after termination of anaesthesia.

Though there is minimal data about nitroglycerine for extubation response, it has also been effectively used as a rescue drug for controlling hypertension during extubation while studying other drugs5,9,10. The drug has also been used by several authors during tracheal extubation with favourable haemodynamic Anant S et al found significant attenuation of hypertensive response to laryngoscopy and intubation following intranasal NTG spray. The increase in heart rate was comparable with the control patients.

Results of the present study also confirm similar haemodynamic changes with sublingual nitroglycerine spray used during tracheal extubation in both normotensive and hypertensive patients.

Conclusion

Sublingually administered nitroglycerin spray in a dose of 0.8 mg prior to imtubation is an effective, practical, easy and relatively safe method of protecting patient from the hypertension and complications related with hypertension without much affecting heart rate. It stabilizes haemodynamics , allows easy intubation, provides a more comfortable induction.

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