Prevention of Hypertension at Intubation: A Controlled Study of Sublingual Nifedipine in Normotensive Patients Undergoing Elective Surgery
Nirmal Kumar Gyawali

ABSTRACT
Background: Hypertension and tachycardia induced after laryngoscopy and intubation can be prevented by various methods like deep inhalation anaesthesia, intravenous opioids, topical intravenous lidocaine, intravenous adrenergic blocking drugs and pretreatment with antihypertensive.

Methods: It is a randomized controlled double blind prospective study of two groups consisting of 30 patients in each group. Group A were control group and group B were Nifedipine group who were pretreated with Nifedipine. Aim of this study was to assess the effectiveness of pretreatment with nifedipine in prevention of the hypertensive response to laryngoscopy and endotracheal intubation in normotensive patients undergoing elective surgery.

Result: Sublingual nifedipine was significantly effective in decreasing systolic and diastolic blood pressure produced by laryngoscopy and tracheal intubation, but its role in decreasing pulse rate was not significant.

Conclusion: Nifedipine is useful to prevent laryngoscopy and intubation induced hemodynamic response.

KEY WORDS: Intubation, laryngoscopy, hypertension, Pharmacology of Nifedipine, sublingual
INTRODUCTION
Transient hypertension and tachycardia are commonly associated with laryngoscopy and tracheal intubation\textsuperscript{1,2}. These must be considered as potent noxious stimuli because of their effects on autonomic nervous activity. Hypertension and tachycardia may be inconsequential in healthy patients but detrimental to those with ischaemic heart disease or increased intracranial pressure and have been the subject of many studies in order to determine an effective method of prevention. Various attempts have been made to block this stress response but most of the attempts are only partially successful\textsuperscript{3,4}.

Nifedipine is calcium channel entry blocker which produces dilatation of both peripheral and coronary arteries\textsuperscript{5}. There are different classes of calcium channel entry blocker, the classification proposed by the WHO divide the calcium channel entry blockers into two groups: group A consist of calcium entry blocker selective for slow calcium channel derivative e.g. verapamil and derivatives likedihydropyrodin(DPN),nifdefipine,nicardipine,nimodipine,nitredipine and diltiazem. Group B consists of calcium channel entry blocker, non-selective for slow calcium channel e.g.: diphenyl piperzazeios, bepridel, perhexiline. The general objective of study was to find out incidence of laryngoscopy and intubation induced hypertension and role of nifedipine in prevention of intubation and laryngoscopy induced hypertension and tachycardia.

METHODOLOGY
This is an interventional study (Randomized controlled trial) conducted in Western Hospital and Research Centre Nepalgunj in the year 2014/2015. Informed consent was obtained from each of the patients included in the study. Study was conducted in 60 patients of both sexes of ASA classification I and II in the age range of 20-60 years and weight between 35to70kg undergoing elective surgeries. Informed consent was obtained in all instances. Preanesthetic examination of the patients was done and patients were kept nil orally after 11pm the day before surgery.
In the morning, half an hour before operation patients were brought in the preanesthetic room and Blood pressure was recorded by assistant. An intravenous line was established with 18 gauze cannula and ringer’s lactate infusion was started. Patient selection was done by lottery method to decide whether or not to give nifedipine. The anesthetic assistant gave 5mg nifedipine capsule to group B patient ten minutes before induction. The capsule was pierced with needle and contents squeezed out under tongue. Group-A patients were given nothing, after recording of BP and Pulse rate patients were sent to operation room. In operation room intubation done by investigator. Intravenous pethedine 0.5mg/ kg was given before induction and Induction was done with thiopental 6mg/kg, Succinycholine 1.5 mg/kg and patients were intubated with appropriate sized endotracheal tube. During induction and intubation patient showing any unusual effect (coughing, vomiting) were grouped as stressful laryngoscopy and they were not included in the study. Student’s t test for paired observations was used for analysis within group and unpaired t test was used for analysis between the groups. P<0.05 was considered statistically significant.

**Exclusion criteria**

Patients with history of hypertension and cardiovascular disease.

Patients above 60 years and below 20 years.

Patients showing stressful feature during Induction (coughing, vomiting).

**RESULTS**

Demographic characteristics of the patients under study is shown in the table below.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Control group</th>
<th>Nifedipine group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td><strong>Age (Mean±SD)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years</td>
<td>39.93±3.55</td>
<td>38.83±2.15</td>
</tr>
<tr>
<td>Weight (Mean±SD)</td>
<td>44.57±5.3 kg</td>
<td>42.73±2.5 kg</td>
</tr>
</tbody>
</table>

There was no significant difference in the mean age and weight of the patients in control group compared to Nifedipine group.
Changes in cardiovascular variables in control group and Nifedipine group before pretreatment and after laryngoscopy

<table>
<thead>
<tr>
<th>Variables</th>
<th>Before pretreatment</th>
<th>After pretreatment</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systolic Blood Pressure (mm Hg)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Control group</td>
<td>119.07 ± 6.13</td>
<td>147 ± 6.12</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>In Nifedipine group</td>
<td>123.50 ± 5.59</td>
<td>145.67 ± 6.12</td>
<td></td>
</tr>
<tr>
<td><strong>Diastolic BP (mm Hg)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Control group</td>
<td>79 ± 6.07</td>
<td>89 ± 6.06</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>In Nifedipine group</td>
<td>80.77 ± 6.49</td>
<td>83.50 ± 5.8</td>
<td></td>
</tr>
<tr>
<td><strong>Pulse rate (bpm)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Control group</td>
<td>81.30 ± 3.6</td>
<td>92.86 ± 7.5</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>In Nifedipine group</td>
<td>83.23 ± 3</td>
<td>93.30 ± 5.6</td>
<td></td>
</tr>
</tbody>
</table>
Systolic Blood Pressure increased after laryngoscopy and intubation in control patients as well as in Nifedipine treated patients, however the increase in Systolic Blood Pressure was significantly less in nifedipine treated patients (P<0.05).

Similarly, Diastolic blood pressure also increased in both the groups after intubation but this rise in Diastolic BP was significantly lesser in Nifedipine treated group compared to control group (P<0.05). There was an increase in pulse rate after laryngoscopy in both the groups but no significant difference existed between the two groups (P>0.05).
Reflex increase in cardiovascular responses to laryngoscopy and intubation are tachycardia and hypertension which is common during induction of anesthesia. This is due to positive increase in sympatho-adrenal activity and definite increase in plasma adrenaline, non-adrenaline and dopamine level in patients undergoing endotracheal intubation. The magnitude of change of clinical parameters in MAP and cardiac rhythm paralleled the significant increase in catecholamines. An increase in blood pressure associated with tracheal intubation may be dangerous and may cause complication including pulmonary edema. These facts are derived from studies during different forms of inhalation anesthesia, and are interpreted as being the result of reflex sympatoadrenal stimulation. The severity of this response in normotensive patients are less certain. The purpose of our study was to measure the cardiovascular response to laryngotracheal stimulation in healthy patient without cardiovascular diseases to avoid myocardial ischemia at intubation. In our study we found nifedipine was affective to attenuate cardiovascular response to intubation and laryngoscopy. Nifedipine is an antagonist of Calcium channel through the slow channel of cell membrane and it has been shown to be an effective treatment for mild to moderate...
hypertension as well as stable, variant and unstable angina \(^{12,13}\). Our study shows that sublingual nifedipine attenuated the increase in systolic and diastolic blood pressure produced by laryngoscopy and tracheal intubation, but its role in decreasing pulse rate was not significant. Similar study done by N Kumar in woman with pregnancy induced hypertension scheduled for caesarian section under general anesthesia. They found sublingual nefedipine effective in attenuating the hypertensive response to laryngoscopy and intubation\(^{14}\). Nifedipine versus fentanyl to prevent the pressure response to tracheal intubation study done by Abdel Razek et al \(^{15}\). Their conclusion was that nifedipine was better than fentanyl in blocking the pressure response. Peripheral vasodilation and the resulting decline in blood pressure produced by Nifedipine activates baroreceptors leading to increased peripheral sympathetic nervous system activity most often manifesting as elevated heart rate. This increased nervous system activity counters the direct negative ionotropic and chronotropic effects of the nifedipine. A study by Fenkal et al indicated that nifedipine has greater efficiency than hydralazine in achieving control BP in severe preeclampsia.\(^{6}\)

CONCLUSION

The nifedipine was found to be effective in attenuating hemodynamic responses following laryngoscopy and intubation. Increase in Blood pressure and tachycardia to laryngotraheal stimulation are present in all patients which is of short duration but can give detrimental effect to the patients with cardiovascular diseases so prevention of this haemodynamic response should be practiced during induction and intubation.

REFERENCES


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