

Original Research Article


# Comparative clinical study of attenuation of cardiovascular responses to laryngoscopy intubation diltiazem, lignocaine and combination of diltiazem and lignocaine

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## Abstract

**Background:** In contributing the patient care, Anaesthesia and endotracheal intubation have become a core part of anaesthesiologists. Via nose or mouth, the trans-laryngeal placement of endotracheal tube into the trachea is called endotracheal intubation.

**Aim:** To compare responses of lignocaine and diltiazem and combination of both on cardiovascular endotracheal intubation in healthy, normotensive patients.

**Materials and methods:** This was a prospective randomised study, 80 patients were scheduled for tubectomy, cholecystectomy, appendectomy, abdominal and vaginal hysterectomy. These patients were divided into four groups, 20 in each group. Group I received normal saline, Group II received lignocaine and normal saline, Group III received diltiazem and normal saline, Group IV received diltiazem and lignocaine.

**Results:** Males were 12, 60% and females were 8, 40% in group I, males were 12, 60% and females were 8, 40% in group II, males were 12, 60% and females were 8, 40% in group III and males were 10, 50% and females were 10, 50% in group II. Most of patients were aged between 21-40 years, group I (90%), Group II (82%), Group III (86%) and Group IV (75%). The mean age of group I was 33.98±8.05, group II was 38.78±9.26, group III was 31.87±5.29 and group IV was 35.68±7.89. The attenuation was maximum in Group IV followed by group II and group III, with respect to heart rate and systolic blood pressure.

**Conclusion:** In normotensive patients, the combination of diltiazem and lignocaine were more effective than when they were administered diltiazem and lignocaine individually for attenuating hemodynamic changes to laryngoscopy and tracheal intubation.

## Key words

Laryngoscopy intubation, Diltiazem, Lignocaine.

## Introduction

In contributing the patient care, Anaesthesia and endotracheal intubation have become a core part of anaesthesiologists. Via nose or mouth, the trans-laryngeal placement of endotracheal tube into the trachea is called endotracheal intubation [1, 2]. Many stressful events at various stages are involved in general anaesthesia. During incubation, intubation and extubation, the most stressful events occur. Reflex sympathetic responses like tachycardia, hypertension, cardiac arrhythmias are one of the commonest responses that occur during laryngoscopy and intubation [3, 4]. In hypertensive patients, the CVS response to intubation is exaggerated. In patients with hypertension, raised intracranial pressure (ICP), cerebral vasculature being diseased, or with ischemic heart disease, CVS response to intubation is of a serious problem. CVS responses to laryngoscopy and intubation may lead to complications such as pulmonary oedema, intracranial haemorrhage, left ventricular failure and arrhythmias [5]. This study evaluates the comparison of responses of lignocaine and diltiazem and combination of both on cardiovascular endotracheal intubation in healthy, normotensive patients.

## Materials and methods

This was a prospective randomised study, 80 patients were scheduled for tubectomy, cholecystectomy, appendectomy, abdominal and vaginal hysterectomy during the period between July 2014 to July 2016. These patients were divided into four groups, 20 in each group. Group I received normal saline, Group II received lignocaine and normal saline, Group III received diltiazem and normal saline, Group IV received diltiazem and lignocaine.

**Inclusion criteria:** ASA PS grade I and II patients, age group of 20 to 50 years of both the genders were included in the study.

**Exclusion criteria:** ASA PS III and IV patients, angina history, palpitations, syncopal attacks, patients who were under treatment of beta blockers, calcium channel blockers, regurgitation problems, respiratory problems, more than 15 seconds of endotracheal intubation duration were excluded.

Informed written consent was obtained from patients after pre-anaesthetic evaluation. Baseline haemodynamic parameters were recorded. Parameters such as diastolic blood pressure, systolic blood pressure, mean arterial pressure, heart rate were recorded at pre-induction, post induction during laryngoscope and during intubation, 1, 2, 3 and 5 minutes after intubation. Any adverse events were observed during perioperative period.

## Results

In this study, a total of 80 patients fulfilled the inclusion criteria.

**Table - 1** showed that males were 12, 60% and females were 8, 40% in group I, males were 12, 60% and females were 8, 40% in group II, males were 12, 60% and females were 8, 40% in group III and males were 10, 50% and females were 10, 50% in group II.

**Table - 2** showed that most of patients were aged between 21-40 years, group I (90%), Group II (82%), Group III (86%) and Group IV (75%). The mean age of group I was  $33.98 \pm 8.05$ , group II was  $38.78 \pm 9.26$ , group III was  $31.87 \pm 5.29$  and group IV was  $35.68 \pm 7.89$ .

**Table - 3** and **Table - 4** showed that the by group II and group III, with respect to heart attenuation was maximum in Group IV followed rate and systolic blood pressure.

**Table – 1:** Sex distribution.

Sex Distribution	Males, Percentage	Females, Percentage
Group I	12, 60%	8, 40%
Group II	12, 60%	8, 40%
Group III	12, 60%	8, 40%
Group IV	10, 50%	10, 50%

**Table – 2:** Age distribution.

Age Distribution (21-40years)	Number of patients	Mean Age (years)
Group I	90%	33.98±8.05
Group II	82%	38.78±9.26
Group III	86%	31.87±5.29
Group IV	75%	35.68±7.89

**Table – 3:** Comparison of heart rate changes at regular intervals.

Time	Group I (n=20)	Group II (n=20)	Group III (n=20)	Group IV (n=20)
Pre induction	85.52 ±8.09	85 ±1.20	85.12±6.30	82.28±3.87
Post induction	93.62±7.22	70.87±6.39	91.52±6.87	89.35±8.97
During Laryngoscopy	125.68±9.33	85.69±1.00	105.98±3.22	86.98±7.89
After 1 min	125.82±2.11	84.32±6.99	103.69±8.11	84.65±9.88
After 2 mins	117.98±4.15	78.25±6.33	83.66±9.98	83.54±7.80
After 3 mins	114.25±9.65	73.25±8.44	98.52±3.22	83.67±1.22
After 5 mins	113.25±5.02	70.25±6.55	97.98±2.55	83.56±9.97

**Table – 4:** Comparison of systolic blood pressure changes in regular intervals.

Time	Group I (n=20)	Group II (n=20)	Group III (n=20)	Group IV (n=20)
Pre induction	122.36±7.22	117.63±6.55	121.56±9.65	121.98±4.57
Post induction	121.69±5.87	118.56±8.99	118.26±9.54	118.25±3.35
During Laryngoscopy	157.28±5.87	134.25±8.61	131.54±5.01	118.64±2.11
After 1 min	156.89±2.01	130.28±5.24	126.54±6.25	126.58±5.24
After 2 mins	151.63±1.05	130.86±0.35	125.85±1.05	124.23±5.98
After 3 mins	145.28±4.02	125.11±1.11	122.56±2.44	122.57±4.03
After 5 mins	145.28±3.66	116.28±2.07	119.58±4.56	119.58±2.33

## Discussion

Since a long time, the anaesiologists knew the reflex haemodynamic response to laryngoscopy and tracheal intubation. Monojit Mondal, et al. [6]; conducted a study to evaluate find out the efficacy of intravenous diltiazem, lignocaine and combination of both in reducing the effect on

cardiovascular system to laryngoscopy and endotracheal intubation in healthy, ASA PS I and normotensive ASA PS II patients. In this Prospective randomized control study, Patients who are scheduled for total abdominal Hysterectomy, vaginal hysterectomy, laparoscopic Appendectomy, tubectomy and cholecystectomy were divided into four

groups, Group 1 received normal saline, Group II received lignocaine 1.5 mg/kg, Group III received diltiazem 0.3 mg/kg, and Group IV received combination diltiazem 0.3 mg/kg and lignocaine 1.5 mg/kg. Hemodynamic parameters such as heart rate, systolic and diastolic blood pressure and rate pressure product products are recorded at regular intervals. The data analysis is performed by univariate analysis. The hypothesis is validated by various statistical methods by using statistical packages for social sciences (SPSS 17.0 version). Total 100 patients within age group of 20-50 years were selected for study, 25 in each group, the mean weight in Group I was  $53.40 \pm 6.17$  Kgs, in Group II it was  $53.40 \pm 6.73$  Kgs, in Group III  $52.64 \pm 8.164$  Kgs and Group IV was  $52.96 \pm 8.97$  kgs suggesting mean weight in four groups were comparable. In present study with respect to heart rate, systolic and diastolic blood pressure, mean arterial pressure and rate pressure product there was attenuation all these parameters in all groups but the attenuation was maximum in Group IV followed by Group II and Group III respectively. The data from our study suggests that with combination of both diltiazem and lignocaine is significantly more effective than anyone alone for attenuating hemodynamic changes to laryngoscopy and tracheal intubation in normotensive patients. Sameenakousar, et al. [7]; the purpose of this study was to compare these agents, to find the drug which was best suited for this purpose and the most favourable time for its administration. This was a prospective study which involved 3 groups of patients. The patients in group-1 (control) were given normal saline and the groups 2 and 3 were given i.v. fentanyl and clonidine respectively. Each group had 50 patients who presented for elective, non-cardiovascular surgeries. All the patients were ASA-1 or ASA-II and were operated in PESIMSR, Kuppam. The heart rate rise was 48.07% in the control group, whereas it was significantly lower in the fentanyl (II) 27.75% and the clonidine groups (III) 12.57% ( $p < 0.001$ ). In the control group, the systolic blood pressure increased maximally after 5 minutes (42.62%) i.e., immediately after the

laryngoscopy and the intubation. It decreased gradually over 10 minutes (17.39%). With the administration of fentanyl, the maximum increase as compared to the preinduction value was 9.91%, but it was only 7.38% in the clonidine group. Both, when they were compared with the control, showed a significant suppression ( $P < 0.001$ ), with clonidine showing better results. The maximum increase in the diastolic blood pressure was 30.12% in the control group ( $P < 0.001$ ) at 5 min and it was 18.22%, and 6.15% in the fentanyl and the clonidine groups respectively, with clonidine faring better again ( $P < 0.001$ ). Clonidine showed better attenuation of the sympathetic response, which is statistically highly significant and it remained so till the end of 10 minutes. Intravenous clonidine  $2 \mu\text{g}/\text{kg}$  which is administered 5 minutes before the laryngoscopy can be recommended to attenuate the sympathetic response to the laryngoscopy and the intubation. Fujii Y, et al. [8]; this study was undertaken to compare the efficacy of combined diltiazem and lidocaine with each drug alone in suppressing the hemodynamic changes during tracheal extubation. Sixty hypertensive patients (ASA II), defined as systolic blood pressure  $> 160$  mmHg and/or diastolic blood pressure  $> 95$  mmHg (WHO), undergoing elective orthopedic surgery received, in a randomized, double-blind manner,  $0.2 \text{ mg} \times \text{kg}^{-1}$  diltiazem,  $1.0 \text{ mg} \times \text{kg}^{-1}$  lidocaine, or  $0.2 \text{ mg} \times \text{kg}^{-1}$  diltiazem plus  $1.0 \text{ mg} \times \text{kg}^{-1}$  lidocaine ( $n=20$  of each) i.v. before tracheal extubation. Changes in heart rate (HR), mean arterial pressure (MAP) and rate-pressure product (RPP) were measured before and after tracheal extubation. Hemodynamic changes during tracheal extubation were less in patients receiving diltiazem plus lidocaine than in those receiving diltiazem or lidocaine as a sole medicine (RPP;  $10322 \pm 1674$  (combined) vs  $11532 \pm 1802$  (diltiazem),  $15388 \pm 2050$  (lidocaine), mean  $\pm$  SD,  $P < 0.05$ ). Combined diltiazem and lidocaine is more effective prophylaxis than diltiazem or lidocaine alone for attenuating the cardiovascular responses to tracheal extubation and emergence from anesthesia in hypertensive patients. R. Gupta, et

al. [9]; conducted a study to compare the clinical efficacy and safety of diltiazem-lidocaine combination in attenuating pressor response to tracheal intubation with lidocaine and diltiazem alone. A prospective double blind, randomised clinical trial of efficacy and 120 ASA grade I&II patients were randomly divided in to four groups (using a random sequence generator) of 30 each according to the drug given before intubation to attenuate the hemodynamic response to intubation: saline in control group, diltiazem in D group, lidocaine in L group and both diltiazem and lidocaine in DL group. The person A prepared the drugs, B injected the drug and C evaluated the response; B and C were thus unaware of the drug given. Statistical analysis used. Demographic profiles were evaluated statistically using CHI square test. Changes in haemodynamic parameters were compared using paired t test within the group. Inter group comparison were done by one way analysis of variance (ANOVA). Results: The attenuation of hemodynamic response occurred maximal in DL group followed by lidocaine and diltiazem group respectively (P value < 0.001 till 5 minutes postintubation for BP and HR). Lidocaine controlled both heart rate and blood pressure better than Diltiazem as there was reflex tachycardia to some extent in D group due to reflex sympathoadrenal stimulation. Diltiazem-Lidocaine combination controlled both these parameter to optimal levels. The primary outcome of the study is that Diltiazem-Lidocaine combination is safe and effective in attenuating pressor response to tracheal intubation. We recommend its routine used before intubation. Mollick MT, et al. [10]; A prospective comparative study was done on lignocaine versus lignocaine with pethidine to observe the effect on cardiovascular response to laryngoscopy and endotracheal intubation. One hundred such elective surgical patients of active age group (16 - 60 years) having American Society of Anaesthesiologist (ASA) physical status I & II irrespective of surgical procedure were randomly assigned to one of the two groups of 50 each. Group I received injection lignocaine 1 mg/kg intravenously 02 minutes before

induction of general anaesthesia. Patients in group II received injection pethidine 1 mg/kg body weight and injection lignocaine 1 mg/kg body weight intravenously 02 minutes before induction of general anaesthesia. Haemodynamic parameter i.e. blood pressures (systolic blood pressure, diastolic blood pressure and mean blood pressure), heart rate, rate pressure product were monitored after 1st, 3rd, 5th minutes following intubation. There were statistically significant ( $p < 0.001$ ) increase in blood pressures, heart rate and rate pressure product in group I i.e. pretreatment with 1 mg/kg body weight intravenous lignocaine and remained so after 5 minutes. On the other hand there were no statistically significant ( $p > 0.05$ ) increase in heart rate, blood pressures and rate pressure product in group II, where pre-treatment done with pethidine 1 mg/kg body weight with lignocaine 1 mg/kg body weight and the values returned control level before 5 minutes. The study showed that pethidine 1 mg/kg body weight with lignocaine 1 mg/kg body weight pretreatment suppresses the cardiovascular response due to laryngoscopy and intubation.

## Conclusion

In normotensive patients, the combination of diltiazem and lignocaine were more effective than when they were administered diltiazem and lignocaine individually for attenuating hemodynamic changes to laryngoscopy and tracheal intubation.

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