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Original Research Article

Efficacy of IV Lidocaine in attenuating the hemodynamic responses to laryngoscopy and intubation

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Abstract

Aims & Objectives: To determine the efficacy of IV Lidocaine in attenuating the hemodynamic responses to laryngoscopy and intubation and to statistically compare and analyse the results obtained.
Materials & Methods: The study was conducted in 50 ASA I & II patients who were randomly allocated into two groups. Group I patients received IV rocuronium 1.2 mg/kg along with thiopentone induction and the pressor response to laryngoscopy and intubation was assessed at subsequent intervals in the next 10 minutes. Group II patients received IV rocuronium 1.2 mg/kg and IV Lidocaine 1.5 mg/kg along with thiopentone induction and the pressor response to laryngoscopy and intubation was assessed at subsequent intervals in the next 10 minutes.
Results: Lidocaine suppresses the pressor response to laryngoscopy and intubation in the current study.
Conclusion: We found out that intravenous lignocaine is effective to attenuate the pressor response if given along with induction not just before intubation.
Keywords: Laryngoscopy, intubation, intravenous lignocaine, pressor response.

1. Introduction

Endotracheal intubation is the essential component of providing general anaesthesia. It is a noxious stimulus and is therefore associated with certain hemodynamic responses such as sinus tachycardia, hypertension and arrhythmias in all patients [1-3]. The pressor response to laryngoscopy and intubation has been recognised since a long time [4].

These responses are of considerable interest to the anaesthesiologist as they may have delirious effects on the patients. These changes usually subside within 5 to 10 minutes. These changes are attributable to reflex sympathoadrenal stimulation. Tomori and Widdicombe (1969) recorded increased cervical sympathetic activity in anaesthetised cat following stimulation of the nasopharynx region [5]. Similar studies in humans involving measurement of plasma catecholamines have consistently recorded neither increase in nor adrenaline levels following laryngoscopy [6-9]. These responses are of little clinical significance in normotensive patients but may be delirious both in treated and untreated hypertensive patients [10,11]. This may be attributed to the already increased sympathetic activity in patients with essential hypertension [12]. This stimulation may cause rise in blood pressure, left ventricular failure (Masson, 1964), myocardial schema, intracranial haemorrhage and increase in intracranial pressure [10,13-16]. Patients with ischemic heart disease and hypertension have been shown to carry an increased risk of preoperative complications [12,17]. The aim of the current study was to compare the hemodynamic response to laryngoscopy and intubation and to determine the efficacy of IV Lidocaine in attenuating this hemodynamic response in adult surgical patients posted for elective surgery under general anaesthesia.

2. Materials and Methods

This study for the comparison of hemodynamic response to laryngoscopy and endotracheal intubation was conducted at Government Medical College Patiala, Punjab. A total of 50 patients of ASA I & II grade of either sex or aged between 18-50 years of age scheduled for elective surgery under general anaesthesia with intubation were

randomly selected and informed consent was taken. Patients with suspected airway problems and suspected difficult intubation (other than MP I & II anatomy), pregnant females, debilitated and cachexia patients, obese patients and those with pulmonary arterial hypertension, valvular heart disease and with known hypersensitivity to drugs were excluded.

Group I: Patients received IV rocuronium 1.2 mg/kg and pressor response to laryngoscopy and intubation was assessed at 1, 3, 5 & 10 minutes.

Group II: Patients received IV rocuronium 1.2 mg/kg and IV Lidocaine 1.5mg/kg and pressor response to laryngoscopy and intubation was assessed at 1, 3, 5 & 10 minutes.

After noting preoperative pulse rate, SpO2 & blood pressure patients were given Inj. Pentazocine 0.6 mg/kg IV before induction. Patients were pre oxygenated with 100 % oxygen for 3 minutes. Anaesthesia was induced with 2.5 % thiopentone 4-6 mg/kg IV till the loss of eyelash reflex. Lidocaine was given as bolus in group II just before thiopentone injection. Patients and intubating anaesthetists were blinded to the study solutions administered.

3. Results

The demographic profile of patients such as age, gender, weight and baseline hemodynamic parameters were comparable in between group I and group II as shown in Table 1. The mean age of patients was comparable in between group I (34.12±12.68 years) and group II (34.40±10.17 years). The majority of patients in both groups were females; being 76% in each group. The groups were statically comparable. Pulse rate, systolic BP and diastolic BP of patients were found to be comparable in between groups (p>0.05).

Table 1: Distribution of cases according to age

	Group I (n=25)	Group II (n=25)	p-Value
Age (years) Mean±SD	34.12±12.68	34.40±10.17	>0.05
Gender Male Female	6 (24%) 19 (76%)	6 (24%) 19 (76%)	>0.05
Weight (kg) Mean±SD	58.20 ± 4.12	56.24 ± 4.10	>0.05
Hemodynamic Variables			
Heart rate (beats/min)	76.64±5.74	79.52±6.14	0.093
Systolic BP (mmHg)	122.64±7.80	122.24±7.86	0.857
Diastolic BP (mmHg)	77.04±6.27	78.32±5.91	0.471

Data are represented as mean, ±SD, n (%) and ratio.
SD=Standard deviation

Mean pulse rate was not significantly different in between group I and group II at baseline, induction and 10 min. Whereas it was significantly different in between groups at 1 min, 3 min and 5 min [Figure 1]. Moreover the change in baseline pulse rate was statistically significant observed in group I and group II at 1 min, 3 min and 5 min.

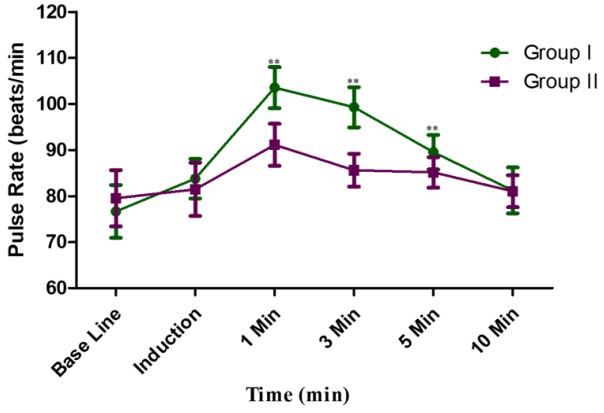

Figure 1: Pulse rate (beats/min)

Systolic blood pressure (DBP) of patients was compared in between group I and group II at baseline, induction and 10 min while it was significantly different at 1 min, 3 min and 5 min [Figure 2]. Change in baseline SBP was statistically significant observed in group I and group II at 1 min, 3 min and 5 min.

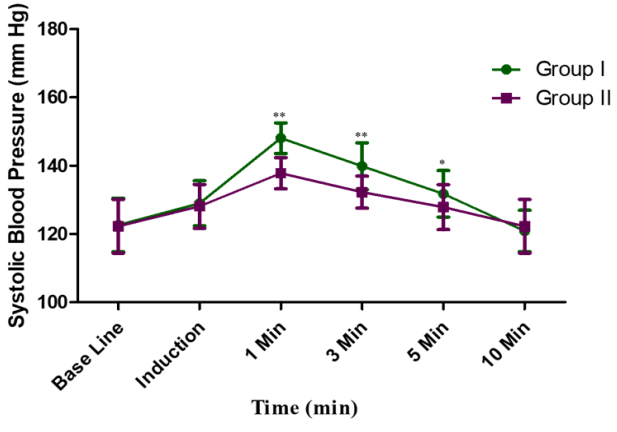

Figure 2: Systolic BP (mmHg)

Diastolic blood pressure (DBP) of patients was compared in between group I and group II at baseline, induction and 10 min while it was significantly different at 1 min, 3 min and 5 min [Figure 3]. Change in baseline DBP was statistically significant observed in group I and group II at 1 min, 3 min and 5 min.

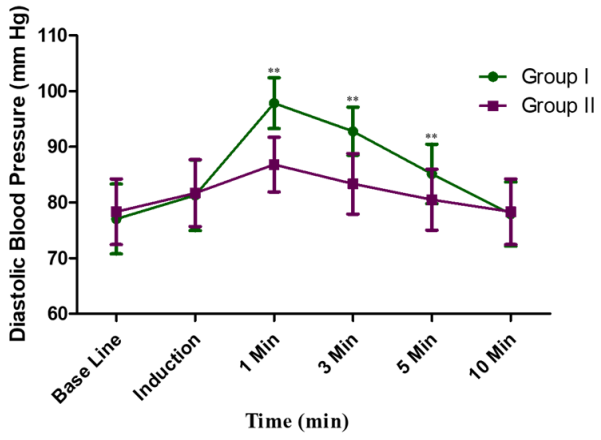

Figure 3: Diastolic BP (mmHg)

4. Discussion

The administration of IV Lidocaine has been shown to suppress both mechanically and chemically induced airway reflexes in a dose dependant manner [18-21]. The mechanism by which IV Lidocaine surpasses airway reflexes is unknown. However rapid equilibrium of local anaesthetics between blood and brain suggest that a depressant effect on the central neutrons may contribute to this action. Lidocaine produces a central sedative analgesic affect when introduced in the blood stream at appropriate doses. A peripheral tissue effect is also present, which, in part accounts for the suppression of reflexes [18]. Suppression of pharyngeal and laryngeal reflexes permits the maintenance of airways in lighter planes of anaesthesia. When Lidocaine was used with alfentanyl for intubation in the absence of neuromuscular blocking agents [19-21]. It has shown to reduce the coughing and bucking by the patient.

The plasma concentration of Lidocaine correlates with the suppression of the cough reflex [22]. But if the dose of lidocaine is increased to 2mg/kg IV then there may be systemic side effects at this dose [23]. There is a chance of convulsions at these doses. At a blood concentration of >7ug/ml of blood there may be other side effects [18]. There may be chances of allergy, idiosyncratic reactions, respiratory depression and reduction in cardiac output.

While administering general anaesthesia both laryngoscopy and endotracheal intubation may cause significant pressor response manifested as increased heart rate, blood pressure and cardiac arrhythmias. This vasopressor response is mostly well tolerated by normotensive patients but the same response may create problems if the patient is hypertensive [10].

Abou Madi *et al* (1977) studied the cardiovascular response to laryngoscopy and tracheal intubation following small (1 % 0.75 mg/kg) and large (2 % 1.5 mg/kg) iv doses of lidocaine and concluded that larger doses caused borderline protection against hypertension and tachycardia while smaller doses prevented only the rise in blood pressure [24]. Helfman *et al* (1991) compared lidocaine (200mg), fentanyl (200ug) and esmolol (50mg) to prevent tachycardia and hypertension associated with tracheal intubation [25]. They concluded that lidocaine was not more effective than the control group in attenuating the rise in pulse rate.

Feng *et al* (1996) compared lidocaine (2mg/kg), fentanyl (3 ug/kg) and esmolol (2mg/kg) for attenuation of cardiovascular responses to laryngoscopy and intubation [26]. Incidence of tachycardia was 15% in the esmolol group, 85% in the control group and 75 % in the lidocaine group and therefore concluded that lidocaine provided no protection against the increase in heart rate.

The results of the present study are consistent with these studies that lidocaine attenuates the pressor response to laryngoscopy and intubation if given prior to induction with thiopentone.

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