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Original Research Paper

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EFFECT OF INTRAVENOUS LIGNOCAINE VERSUS INTRAVENOUS ESMOLOL IN ATTENUATION OF HEMODYNAMIC RESPONSES TO EXTUBATION IN ADULT PATIENTS: A COMPARATIVE STUDY

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ABSTRACT

Background: The present study aims at comparing the efficacy of intravenous Esmolol to Intravenous Lignocaine in attenuation of hemodynamic stress response to endotracheal extubation in cases of elective surgery in adult patients. **Methodology:** 60 subjects were enrolled and by Simple Randomisation, patients were divided into two groups of 30 each, Group E and L Group E received iv. Esmolol 1.5mg/kg and Group L received iv. Lignocaine 1.5mg/kg . Hemodynamic responses were recorded. **Results:** The HR, SBP, DBP, MAP were significantly reduced in Esmolol group than in Lignocaine group, $p<0.05$. **Conclusion:** This study concludes that Intrvenous esmolol 1.5mg/kg is more effective than Intrvenous Lignocaine 1.5mg/kg in blunting the hemodynamic stress response to extubation.

KEYWORDS : Esmolol, Lignocaine, Hemodynamic responses, Extubation.

INTRODUCTION

Endotracheal extubation is a frequent anaesthetic technique that includes removing an endotracheal tube from the trachea via the nose or mouth. Endotracheal extubation is associated with immediate, temporary, substantial, and unfavourable haemodynamics and airway responsiveness as a result of circulatory catecholamine release generated by epip haryngeal and laryngopharyngeal stimulation[1,2].

The cardiovascular reflex induces tachycardia, hypertension, arrhythmia, left ventricular failure, and myocardial ischemia or infarction in vulnerable patients[3,4].

Respiratory problems, which can range from coughing, laryngospasm, to negative pressure pulmonary edema, are three times more likely following tracheal intubation than they are after tracheal extubation[5]. This haemodynamic reaction to tracheal extubation raises serious concerns about consequences such hypertension, tachycardia, and arrhythmia.

Esmolol is a cardioselective beta adrenergic agonist having a half-life of 9 minutes. It has a quick onset and a short duration of action. As a result, its pharmacokinetics are well suited to its usage in reducing the transient and temporary extubation reaction without causing chronic bradycardia and hypotension.

Lignocaine is an aminoethylamide that serves as the prototype for the amide local anaesthetic group[5] It is the most affordable and widely available medication for blunting the sympathetic response to laryngoscopy and extubation.

Subject and method

This prospective, comparative, hospital based study was conducted under the Department of anesthesiology and critical care, Fakhruddin Ali Ahmed Medical college and hospital, Barpeta with due permission and approval from the institutional ethics committee.

Sixty patients with age 18-60 year, ASA physical status I and II and with Modified Mallampati score 1 and 2 scheduled for general surgery under general anaesthesia were selected for the study. Patients refused for the procedure, ASA grade III and IV, Mallampatti grade III, IV, history of allergy to drugs, Requirement of esmolol and lignocaine prior to extubation that is during intubation and intraoperative period were excluded. By Simple Randomisation the patients were divided into two groups of 30 each, Group E and L. Group E received Intravenous Esmolol 1.5mg/kg and Group L received Intravenous lignocaine 1.5 mg/kg.

On the day of surgery, after arrival in operation theater informed consent were taken, and patients were randomly allocated in to two equal groups, group L and group E. On reaching the operation theater, an 18 gauze intravenous cannula was put on dorsum of right hand and intravenous fluid was started. Patient were connected to monitor with standard ASA requirements.

All the patients were given intravenous injection glycopyrrolate 0.004 mg/kg, Intravenous injection midazolam 0.02 mg/kg, intravenous injection fentanyl 1 μg/kg. Preoxygenation was done for 3 minutes. Patients were induced with injection propofol(1.5mg/kg) 1% intravenously until loss of response to verbal stimulus. After that Vecuronium (0.1mg/kg) intravenous was given, after that patient's lungs were manually ventilated for over 3 minutes. After 3 minutes Laryngoscopy and intubation was done in < 15 seconds. Muscle relaxation was maintained with intermittent intravenous vecuronium [0.02 mg/kg] as and when required. Controlled ventilation was maintained with 33% oxygen in 66% nitrous oxide and 0.5% isoflurane inhalation. Inj. Ketorolac 0.5 mg /kg and paracetamol infusion 15mg/kg was given during the intraoperative period. At the completion of surgery, inhalation agents isoflurane and N2O were discontinued and residual neuromuscular blockade was antagonized with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg intravenously, and the patient was extubated.

when the following extubation criteria were fulfilled.

1) Sustained head lift for 5 seconds.
2) Sustained hand grip for 5 seconds.
3) Adequate level of consciousness.
4) Maximum inspiratory pressure 40 to 50 cm H2O or greater.

- Group E will be given esmolol 1.5mg/kg
- Group L will be given lignocaine 1.5 mg/kg

Both these drugs were given 2 minute before the process of extubation Hemodynamic parameters were seen -basal (at the end of surgery after giving reversal) one minute post extubation (T1), 3 minutes post extubation (T3), 5 minutes post extubation (T5) and 10 minutes following extubation (T10).

The incidence of adverse events, i.e. shivering, bradycardia (HR< 60 mm Hg), hypotension (MAP< 65 mm Hg or SBP <100mm hg), nausea, vomiting were recorded.

RESULTS:

The demographic characteristics of the patients in terms of age, weight, height, ASA status was analysed between the groups and statistical tool did not show any significant variation.

Significant difference was found between the Mean Heart Rate between Esmolol and Lignocaine group at 1 minute, 3 minutes, 5 minutes and 10 minutes. The percentage change in Heart Rate in the Esmolol group was 13.5% compared to 18.1% in the lignocaine group

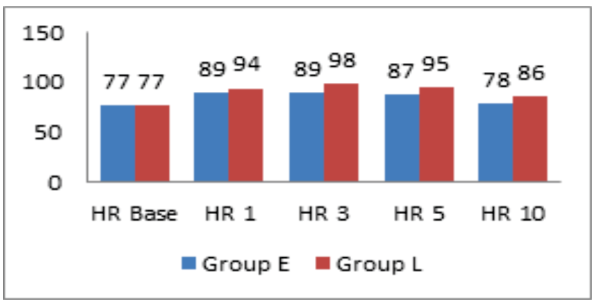

Figure1 : Bar diagram showing mean Heart rate between two groups Esmolol and Lignocaine.

Significant difference was found between the Mean SBP between Esmolol and Lignocaine group at 1 minute, 3 minutes, 5 minutes and 10 minutes. The percentage change in SBP in the Esmolol group was 3.7% compared to 10.4% in the lignocaine group.

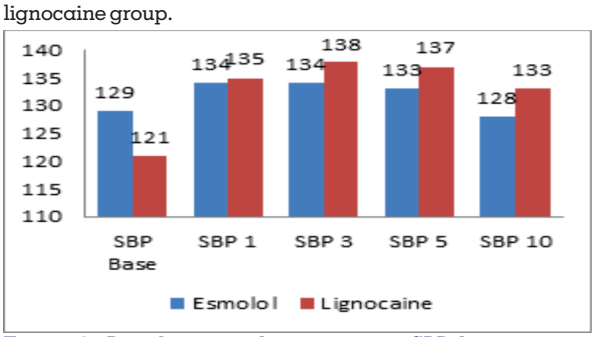

Figure 2: Bar diagram showing mean SBP between two groups Esmolol and Lignocaine

Significant difference was found between the Mean DBP between Esmolol and Lignocaine group at 1 minute, 3 minutes, 5 minutes and 10 minutes. The percentage change in DBP in the Esmolol group was 7.3% compared to 11.0% in the lignocaine group.

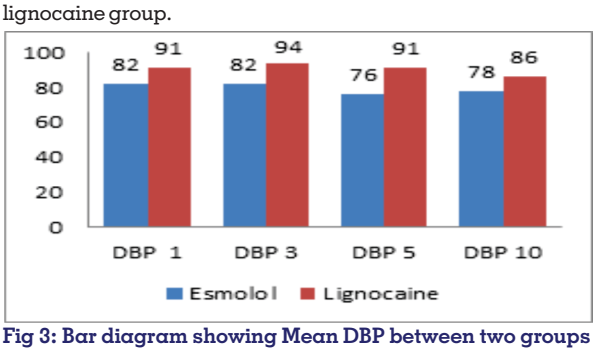

Fig 3: Bar diagram showing Mean DBP between two groups Esmolol and Lignocaine.

Significant difference was found between the Mean MAP between Esmolol and Lignocaine group at 1 minute, 3 minutes, 5 minutes and 10 minutes. The percentage change in MAP in the Esmolol group was 5.1% compared to 11.4% in the lignocaine group.

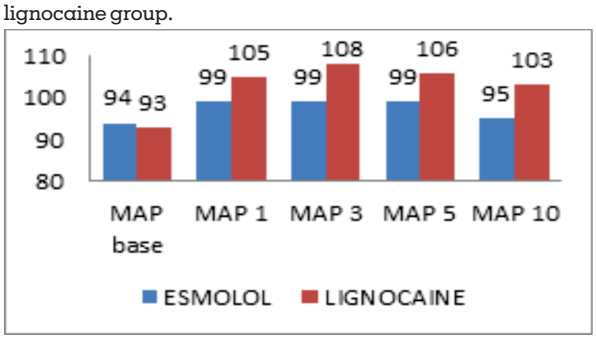

Fig 4: Bar diagram showing Mean MAP between two groups Esmolol and Lignocaine.

Out of 60 subjects, 45(75.00%) did not have any side effects. Bradycardia was present in 6(10%); Hypotension was present in 7(11.7%); Vomiting and Shivering was present in 1(1.70%) each. There was no significant association of side effects in the study groups, p>0.05.

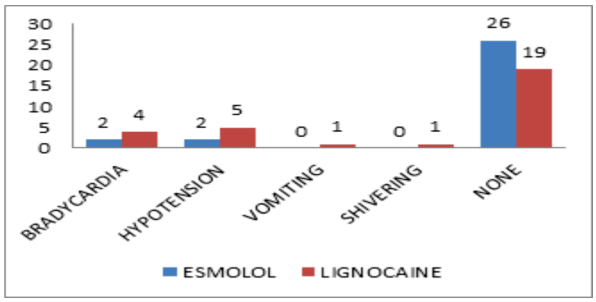

Figure 5: Bar diagram showing distribution of Side effects between two groups Esmolol and lignocaine

DISCUSSION:

The demographic characteristics of the patients of the study group in terms of age, weight, height, ASA status, duration of the surgery were comparable between both the group and statistical tool didn't show any significance. The baseline haemodynamic parameters in terms of heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial pressure (MAP) were comparable between Group Esmolol and Group Lignocaine. Thus, from the above discussion, it may be observed that the comparison of the trial drugs on haemodynamic parameters in the present study is justified, as the demographic data, other patient variables and baseline haemodynamic parameters were comparable in both the groups. Furthermore, the anaesthetic technique and equipment used were same for both the groups. Also, any confounding factors like patients with cardiovascular or respiratory diseases or patients on any drugs affecting the cardiovascular functions were excluded from the study. The two groups differed only with respect to the study drugs that were used. **Kucukosman G et al**[6] observed that when compared to the Placebo group based on post extubation measurements, the Esmolol group had no significant difference for MBP at any time as recorded at the fifth minute (P=0.012) which was consistent with the findings in our study, however They found that the HR value measured at 5th min after extubation was lower in the esmolol group compared to the placebo.

According to **NG CY et al**[7], Intravenous esmolol at 1.5 mg/kg was able to attenuate the hemodynamic response more pronounced when compared to IV lignocaine at 1 mg/ kg from extubation stress in patients with hypertension on treatment. In their study Group Esmolol showed a significant reduction in HR at T-1 up to T-5 when compared to T-0. Also, there was a significant increase in SBP and MAP from T-1 to T-5 and from

T1 to T3 for DBP in Group Lignocaine. The findings of their study were comparable with the findings of our study.

Unlike the findings in our study, **Keskin HE et al**[8] found that DBP at the 5th and 10th min. and MBP at the 10th min. of extubation significantly decreased more in the lignocaine than the esmolol group. They concluded that esmolol and lidocaine were ineffective in suppression of hemodynamic responses at extubation. The difference in the findings from our study was probably due to difference in drug dosage of trial drugs as they used lignocaine 1.5mg/kg and esmolol 1mg/kg while in our study lignocaine was given as 1.5 mg/kg and esmolol 1.5 mg/kg

CONCLUSION:

Tracheal extubation is considered to be the most noxious stimuli which can lead to adverse hemodynamic pressor response especially in cardiovascular compromised patients, necessitating the need for attenuating the pressor responses. The present study compared the efficacy of Intravenous lignocaine versus Intrvenous Esmolol on attenuation of hemodynamic stress response to endotracheal extubation for elective surgery in two different groups-one receiving iv. Lignocaine and the other receiving iv. Esmolol. The heart rate, systolic blood pressure, diastolic blood pressure, Mean Arterial Pressure were significantly reduced in Esmolol than in Lignocaine group. Also at a dose of 1.5mg/kg, the most common adverse effects of esmolol, which is bradycardia can be avoided.

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