

Comparison of Efficacy of Various Doses of Esmolol In Attenuating Pressor Response To Laryngoscopy And Intubation.

Dr (Maj) TV Sree Krishna¹, Dr Ayaskant Sahoo², Dr Sai Dileep V³, Dr S G K Murthy⁴, Dr A S Kameswar Rao⁵, Dr M Sridhar⁶

^{1,3} Post graduate, Department of Anaesthesiology and critical care, KIMS & RF, Amalapuram.

² Senior Resident, Department of Anaesthesiology and critical care, KIMS & RF, Amalapuram.

⁴ Prof & HOD of Anaesthesiology and critical care, KIMS & RF, Amalapuram.

⁵ Prof & Dean, KIMS & RF, Amalapuram.

⁶ Senior Resident, Department of Anaesthesiology and critical care, Andhra Medical College, Visakhapatnam.

Abstract: The hemodynamic response during laryngoscopy and intubation is a unwanted side effect during securing the airway for conducting safe anaesthesia. This study was done to compare the varying doses of Intravenous Esmolol in attenuating the hemodynamic stress responses to laryngoscopy and endotracheal intubation. 60 patients were enrolled in a prospective, randomized and double blind study. The three doses of esmolol studies were 0.5mg/kg, 1.0mg/kg, 1.5mg/kg. We found that even though there was a rise in hemodynamic parameters but the patients treated with esmolol showed greater resistance to abrupt excursions of heart rate and blood pressure. The dosage of 1.5mg/kg was found to be the most efficacious in attenuating the pressor response.

Keywords: Esmolol, Laryngoscopy, Intubation, Pressor response.

I. Introduction

The hemodynamic response during laryngoscopy and intubation should be abolished to balance the myocardial oxygen supply and demand for the safe conduct of anaesthesia. Various pharmacological & non – pharmacological methods have been used to attenuate the hemodynamic response to laryngoscopy & endotracheal intubation. Pharmacological methods like use of Inhalational anesthetics, topical and Intravenous lidocaine, narcotics, β -Blockers, calcium channel Blockers, vasodilators, have been tried. This study was done to compare the varying doses of Intravenous Esmolol in attenuating the hemodynamic stress responses to laryngoscopy and endotracheal intubation.

II. Material And Methods

Sixty ASA I and ASA II patients undergoing elective surgical procedure under general anaesthesia with endotracheal intubation were included in this study after obtaining clearance from institute ethical committee and written informed consent from the patient. **Inclusion criteria:** Age group 20-50 years, Undergoing General anaesthesia with endotracheal intubation. **Exclusion Criteria:** Known allergy or contraindication to Esmolol, anticipated difficult airway cases, patients on beta blockers, full stomach patients, emergency cases, prior known case of Hypertension, Diabetes, Ischemic heart diseases. **Randomization** was done using lottery method. Three groups were made with Group A (Esmolol 0.5 mg/kg), Group B (Esmolol 1.0 mg/kg) Group C (Esmolol 1.5 mg/kg). All the patients were admitted and they underwent relevant investigations. Preoperatively written informed consent was obtained from the patient. Complete Blood Count, Bleeding time, Clotting time, Blood Urea and Creatinine, blood sugar, Serum creatinine and electrolytes, X ray Chest, Electrocardiogram. Other relevant investigations were obtained on the basis of the condition of the patient. Anaesthesia induction was standardized with the following protocol: Night before surgery, Tab Diazepam 10mg and Tab Ranitidine 150mg orally was administered. On the day of surgery All the patients were pre-medicated with Inj. Glycopyrrolate 4 μ g/kg body weight, intramuscularly 45 minutes before surgery. Monitors were connected after shifting to operation theatre with NIBP, ECG, SpO₂. Intravenous line was secured using 18G cannula. Basal pulse rate and blood pressure were recorded. Pre oxygenation was done using 100% Oxygen for 3 minutes. Inj. Fentanyl 2 μ g/kg iv given three minute prior to induction. Esmolol was taken in a 20 ml syringe and diluted to 20 ml and given as bolus over 15-20 seconds two minutes before intubation. One minute later anaesthesia was induced with 2.5% Inj. Thiopentone sodium 5mg/kg intravenously and Inj. Succinylcholine 1.5mg/kg IV given. After satisfying muscle relaxation, the patient was intubated with appropriate size endotracheal tube after doing a proper laryngoscopy within 10-15 seconds. Conditions were prolongation of laryngoscopy time due to difficult intubation, these patients were excluded from the study. Endotracheal tube was secured after confirming

bilateral air entry. Heart Rate, Systolic blood pressure, Diastolic blood pressure and Mean arterial pressures were recorded during administration of the study drug, during induction, during intubation, after intubation and following for about 7 minutes after laryngoscopy and intubation for every minute.

III. Observation And Results

All the three groups were comparable in relation to age sex and body mass index. Heart rate, Systolic blood pressure, Diastolic blood pressure, Mean arterial pressure. All recorded data were analyzed using SPSS software for determining the statistical significance. ANOVA test was used to determine the significance among three groups. Student's t test was used to compare the two groups on mean values of various parameters. The p-value taken for significance is <0.05. The increase in **Heart rate** in the groups A, B, C were 18%, 12% and 5% respectively. The increase in **Systolic blood pressure** in the groups A, B, C were 32%, 24%, 18% respectively. The increase in **Diastolic Blood pressure** in the groups A, B, C were 27%, 22%, 16% respectively. The increase in **Mean arterial pressure** in the groups A, B, C were 29%, 22%, 16% respectively.

IV. Discussion

Vucovic M et al¹, Ebert TJ and Bernstein JS², who found that pressor response to laryngoscopy was significantly less marked in patients given Esmolol 2 minutes before intubation which was similar to our timing of drug administration. In our study also we took 2 minute as the time for administering Esmolol prior to laryngoscopy and intubation. Sheppard et al³, Miller D.R et al⁴, Ganbatz C.L et al⁵ and Sharma et al⁶ compared different bolus dose of Esmolol and concluded that attenuation of intubation response is adequate following 100mg of Esmolol. In our study we found that esmolol 1.5mg/kg is more effective in attenuation of intubation response than esmolol 0.5mg/kg and 1mg/kg. Sharma S, Ghania A⁷ also concluded adequate hemodynamic control was obtained with the administration of Esmolol bolus 2mg/kg. In our study it was Esmolol 1.5 mg/kg IV bolus was effective and safe in blunting the response. Wang L et al⁸ concluded that 1.2 mg/kg bolus of Esmolol was effective and safe. We also used Esmolol in the range of 0.5 mg/kg to 1.5 mg/kg, which were also safe. Analysis of the length of our study showed that Esmolol 1.5 mg/kg was most effective in attenuating the heart rate response to laryngoscopy and intubation. Also, Esmolol 1.5 mg/kg was effective in attenuating the blood pressure increase accompanying laryngoscopy and intubation.

V. Figures And Tables:

Fig 1 Heart rate:

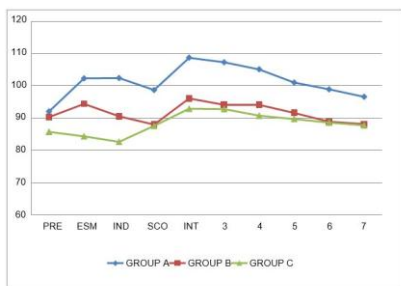


Fig 2 Systolic Blood Pressure:

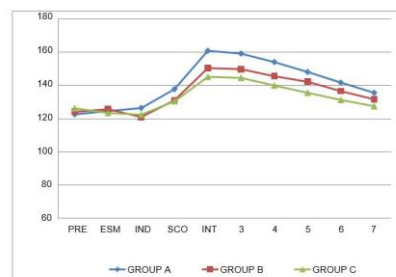


Fig 3 Diastolic Blood Pressure:

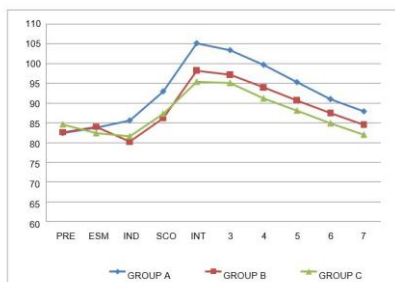
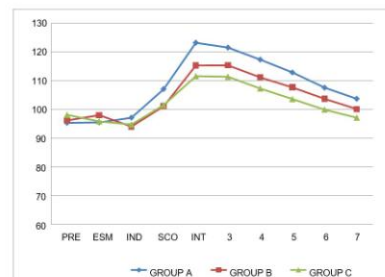


Fig 4 Mean Blood Pressure



VI. Conclusion

From our study it can be concluded that There is **no statistical significance** among the mean value of heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure at the Pre-medication time (p >0.05) in three groups A,B,C where they received 0.5mg/kg, 1mg/kg, 1.5mg/kg of esmolol respectively. There is

significant difference among the mean value of heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure during administration of Esmolol bolus, induction, intubation during and for about seven minutes following laryngoscopy and intubation. It can be concluded that the dose of Esmolol 1.5 mg/kg (Group C) is most effective in attenuating the hemodynamic responses during laryngoscopy and endotracheal intubation with no major adverse effects of Esmolol compared to group A (0.5mg/kg) and group B(1mg/kg).

References

- [1]. Vucovic. M, Pordy G. M., Ellid F.R (1992). Esmolol hydrochloride for management cardiovascular response to laryngoscopy and tracheal intubation; *British Journal of Anaesthesia* (1992). May; 68 (5) 529 -30.
- [2]. Ebert T.J. Bernstein, J.S.Sodwe, D.F, Roerig.D.(1990). Attenuation of hemodynamic response to rapid sequence induction and intubation in healthy patients with a single bolus of Esmolol. *Journal of Clinical Anaesthesia* 1990. Jul- Aug; 2 (4) : 243-52.
- [3]. Sheppard et al (1990). A bolus dose of Esmolol attenuating tachycardia and hypertension after tracheal intubation. *Canadian Journal of Anaesthesia* 1990 Mar (27): 202-5.
- [4]. Miller.D.R, Maurtineaux R.J, Wynands J.E, Hill J (1991). Bolus administration of Esmolol for controlling the hemodynamic response to tracheal intubation.- The Canadian Multicenter trial *Canadian Journal of Anaesthesia* 1991 Oct. 38 (7) 849-58.
- [5]. Ganbatz C.L., Wehner R.J (1991). Effect of Esmolol and Fentanyl in controlling rise in heart rate and blood pressure during intubation. *AANA Journal* 1991 Feb. 59(1): 19-26.
- [6]. Sharma. S et al (1996). Esmolol blunts the hemodynamic response to tracheal intubation in treated hypertensive patients. *Canadian Journal of Anaesthesia* 1996 Aug. 43 (8): 728 – 32.
- [7]. Sharma.S, Ghani.A, Win.N, Ahmad.M (1995). Two bolus doses of Esmolol for attenuation of hemodynamic response to tracheal intubation. *Medical Journal of Malaysia* 1995, Dec; 50(4); 372-6.
- [8]. Wang. L, et al (1999). Bolus administration of Esmolol for preventing the hemodynamic response to tracheal intubation.