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REVIEW ARTICLE

A COMPARATIVE STUDY OF INTRAVENOUS MAGNESIUM SULFATE AND ESMOLOL IN ATTENUATING HEMODYNAMIC RESPONSE TO LARYNGOSCOPY AND INTUBATION

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ABSTRACT: AIMS AND OBJECTIVES: To compare the effect of intravenous Magnesium sulfate and Esmolol in attenuating the hemodynamic response to laryngoscopy and endo-tracheal intubation. **METHODS:** A prospective study was conducted with sixty ASA (American society of Anesthesiologists) grade I and II patients undergoing elective surgery under general anesthesia who were selected to receive Esmolol hydrochloride 1.5 mg/kg or Magnesium sulfate 50 mg/kg randomly. Heart rate and blood pressure recording were done pre-intubation, immediately after intubation and at 2 minutes and 5 minutes after intubation. **RESULTS:** There was a significant rise in heart rate in Group M as compared to Group E ($P<0.05$). No significant difference in mean arterial pressure was seen in both groups. **CONCLUSION:** Esmolol is a better agent to attenuate hemodynamic response to laryngoscopy and intubation than magnesium sulfate as it attenuates the rise in both heart rate and blood pressure.

KEYWORDS: Magnesium sulfate, esmolol hydrochloride, attenuating hemodynamic response, laryngoscopy and intubation.

INTRODUCTION: Hypertension and tachycardia occur from reflex sympathetic discharge in response to laryngo-tracheal stimulation, which leads to increased plasma nor-epinephrine concentration. Many attempts have been made to attenuate the pressor response- Deep anesthesia, topical anesthesia, use of drugs like ganglion blockers, □-blockers, nitroglycerine, etc. Magnesium sulfate may be used for control of hypertensive response. Esmolol is a short acting □-blocker and is good due to cardio-selective action. [1]

METHODOLOGY: This study was a prospective study done on 60 patients in Chalmeda Anand Rao Institute of Medical sciences, Karimnagar from June 2013 to October 2013. Institutional Ethical committee approval was obtained for the study. Sixty patients posted for elective surgeries were randomly selected and were divided in two groups of thirty each i.e. Group E and group M.

The Inclusion criteria for patient selection were age group between 20-60 years, ASA grade I and II and with no contraindications to the study drugs.

Exclusion criteria were patients undergoing emergency surgeries, patients with pre-existing cardiac, renal, hepatic, respiratory, neurological, endocrine and coagulation disorders, morbidly obese and difficult to intubate patients.

Patients were screened for routine laboratory investigations like complete blood picture, complete urine examination, blood sugars, serum electrolytes, blood urea and serum creatinine. The

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procedure was explained to patients and informed consent was taken from all the patients on the day of surgery.

Patients were thoroughly evaluated pre-operatively, kept NPO from previous mid-night, and were administered Alprazolam 0.5mg orally.

On arrival in the operation theatre, a suitable peripheral vein was cannulated with 18G catheter and continuous monitoring of ECG, non-invasive arterial pressure and pulse-oximetry were started and baseline vitals recorded.

Pre-medication with glycopyrrolate 0.2mg intravenously was given. After pre-oxygenation with 100% O2 for 3 min, induction was done with thiopentone sodium 3-5 mg/kg till loss of eyelash reflex. After this, patients were administered the study drug - Group E patients received Esmolol hydrochloride 1.5 mg/kg diluted to 10 ml with Normal saline over 1 min.

Group M patients received Magnesium Sulfate 50 mg/kg diluted to 10 ml with Normal Saline over 1 min[2] Endo-tracheal intubation was facilitated by Inj. Succinyl choline 1.5 mg/kg. Laryngoscopy and tracheal intubation were performed in less than 15 seconds. [3, 4]

Heart rate and Blood pressure recording were done pre-intubation, immediately after intubation and at 2 minutes and 5 minutes after intubation [5] Maintenance of anesthesia was done with oxygen and nitrous oxide with a closed circuit and positive pressure ventilation. Muscle relaxation was achieved with vecuronium 0.1 mg/kg loading and 0.02 mg/kg maintenance doses repeated as necessary. Reversal of residual neuromuscular blockade was done with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg I.V. and extubation done after full clinical recovery.

Statistical Analysis: Data were presented as mean + standard deviation. The data obtained were subjected to statistical computation with paired t-test using statistical package Epi v2.3 Open source Epidemiological statistics for public health and values for $P<0.05$ was considered as significant.

RESULTS:

Demographic Data: All the 60 patients who were included in the study were comparable in age and sex.

	Group E (30 patients)	**Group M (30 patients)**	**P value**
Age (in years)	33.93+ 8.85	34.3 + 10.18	>0.05
Sex (Male: Female)	15:15	14:16	

Pre-intubation heart rates were similar in both the groups but patients in Group E had a significantly lower heart rate as compared to Group M as recorded at various intervals after intubation till 5 minutes.

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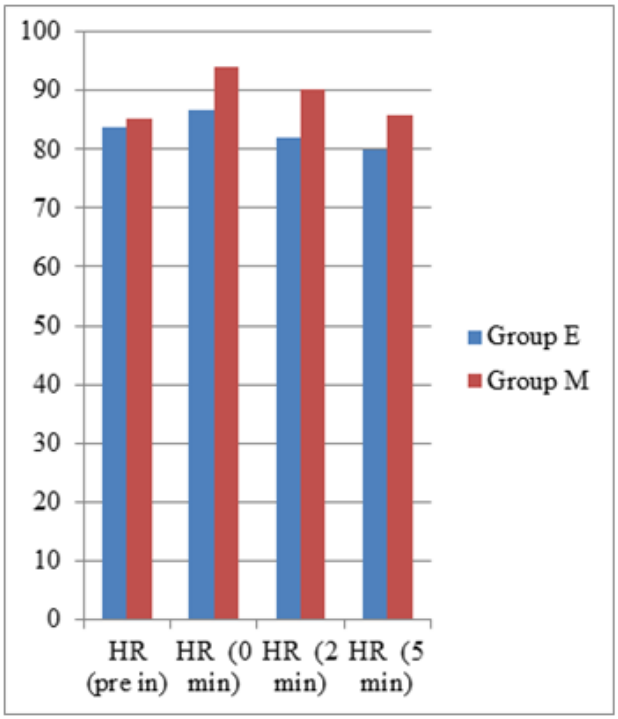
Heart rate	Group E (30 patients)	Group M (30 patients)	P value
HR (pre-intubn)	83.76 + 13.88	85.3 + 11.41	>0.05
HR (0 min)	86.6 + 9.67	93.93 + 12.66	<0.05
HR (2 min)	82.1 + 10.16	90.16 + 12.82	<0.05
HR (5 min)	80 + 9.68	85.86 + 10.05	<0.05



On comparison of mean arterial pressures, there was no significant difference between both the groups both before and after intubation during the study duration

MAP (mm Hg)	Group E (30 patients)	Group M (30 patients)	P value
MAP (pre-intubn)	99.1 + 9.39	95.03 + 9.26	>0.05
MAP (0 min)	117.26 + 18.31	120.86 + 13.06	>0.05
MAP (2 min)	105.93 + 18.07	106.36 + 14.17	>0.05
MAP (5 min)	97.5 + 16.21	101.13 + 13.62	>0.05

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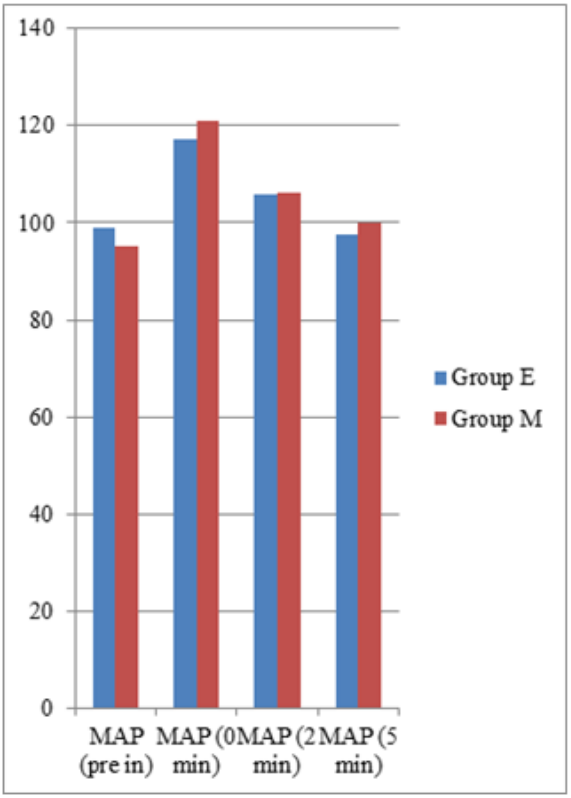

No significant side effects were observed during the study.

DISCUSSION: Transient, selflimiting increase in heart rate and blood pressure are common sequelae of direct laryngoscopy and intubation and are innocuous in healthy individuals but may be hazardous in patients with or at a risk of hypertension, coronary insufficiency or cerebrovascular disease as it may lead to intra-operative myocardial infarction, acute ventricular decompensation, dysrhythmias and intracranial bleed.[4]

Various methods have been tried to attenuate the hemodynamic response to laryngoscopy and intubation. The present clinical study was undertaken to evaluate the effect of two drugs – esmolol and magnesium sulfate as two groups. In group E patients received esmolol 1.5 mg/kg and in group M patients received magnesium sulfate 50 mg/kg. Both groups were compared with respect to hemodynamic parameters and complications at different time intervals till 5 minutes after intubation.

The hemodynamics were comparable in the respective groups pre-operatively with respect to both heart rate and blood pressure. ($P>0.05$).

Abbady A Ahmed[1] observed a statistically significant increase in heart rate, systolic, diastolic and mean arterial blood pressure value in the control group following laryngoscopy and intubation in comparison to the study group receiving 50 mg/kg magnesium sulfate ($P<0.01$).

C. Meningaux et al.[3] observed a significantly higher maximum increase in heart rate and MAP in the control group which received placebo than the study group that received 1 mg/kg esmolol.

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The mean heart rate in group E (86.6+9.67 immediately after intubation) was significantly lower than in group M (96.93+12.66) during the study duration (P<0.05) showing that esmolol had a greater control over heart rate than magnesium sulfate. Our results were in correlation to the study done by Dr. Santosh kumar et al who observed similar response in the study groups receiving 2 mg/kg of esmolol and 60 mg/kg of magnesium sulfate respectively.[5] The heart rate returned to pre-intubation levels by 2 minutes in esmolol group as compared to 5 minutes in magnesium sulfate group.

The mean arterial pressures were comparable in both the groups before and after intubation (P>0.05) and the results were in fair correlation to Juhi Sharma et al.[6] who observed that both magnesium sulfate (40 mg/kg) and esmolol (1.5 mg/kg) had similar control over systolic and diastolic pressures during tracheal intubation in controlled hypertensive patients (P>0.05). However, they observed an increase in heart rate after intubation by 18 bpm in magnesium sulfate group, which is higher when compared to our study. Lesser dose of magnesium sulfate used by them could be the reason.

Mean arterial pressure returned to pre-intubation levels by 5 minutes in both the groups.

No ECG abnormalities, hypotension or bradycardia, which are known side effects of the study drugs[5], were observed in both the groups.

The results were limited due to a small sample size which may not have represented the whole population and failure to do a computer based randomization of cases. The study compared the hemodynamic effects of both the study drugs but did not study them with relation to a control group or placebo.

CONCLUSION: In conclusion, Esmolol is a better agent to attenuate intubation response than Magnesium sulfate as it attenuates the rise in both heart rate and blood pressure.

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