Section: Anaesthesia

Original Research Article

COMPARISON OF INJ. ESMOLOL VERSUS INJ.CLONIDINE FOR ATTENUATION OF HAEMODYNAMIC RESPONSES DURING ENDOTRACHEAL INTUBATION

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Abstract

Background: The present study is being undertaken to evaluate haemodynamic responses of Inj. Esmolol versus Inj. Clonidine during endotracheal intubation with regard to the following parameters: - heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, SpO2.**Materials and Methods:** A prospective randomized study was conducted in sixty patients of ASA grade I, II or III aged between 18 to 50 years scheduled for elective surgical procedures under general anaesthesia. They were divided into two groups: GROUP C: I.V Clonidine 1.5 mcg/kg over 10 minutes before intubation and GROUP E: I.V Esmolol 1.5 mg/kg over 2 minutes before intubation. Patients were monitored for haemodynamic parameters during intraoperative periods for 15 minutes. **Result:** The study demonstrates that Clonidine shows better hemodynamic stability when compared to Esmolol. **Conclusion:** From our study we concluded that iv esmolol and iv clonidine before induction of anaesthesia are safe and effective in attenuating the hemodynamic responses to laryngoscopy and endotracheal intubation but clonidine shows better hemodynamic stability when compared to esmolol.

INTRODUCTION

Stress response under anaesthesia has been a universally recognized phenomenon which may be in the form of endocrine and autonomic disturbances.

The mechanisms of the responses to laryngoscopy are proposed to be by somatovisceral reflexes. Stimulation of proprioceptors at the base of the tongue during laryngoscopy induces impulse-dependent increases of systemic blood pressure, heart rate (HR), and plasma catecholamine11 concentrations. Subsequent endotracheal intubation recruits additional receptors that elicit augmented hemodynamic and epinephrine responses as well as some vagal inhibition of the heart. Sympathetic innervations via cardio accelerator fibers from the upper five thoracic segments increase the rhythmicity of the SA node and enhance the rate and force of contraction.

Laryngoscopy and tracheal intubation induces hypothalamic activity and results in an increased outflow in the sympathetic tracts. Consequently, norepinephrine is released by the postganglionic sympathetic fibers and an increased secretion from adrenal medulla also occurs. This hemodynamic response due to activation of sympatheticoadrenal system12increases heart rate, blood pressure and hence these serve as indirect indices to measure the levels of sympathetic activity clinically. The pressure response in the form of tachycardia, hypertension and arrhythmias may be potentially dangerous. In patients with cardiovascular disease, an increase in blood pressure may lead to complications like arrhythmia, myocardial ischemia.

Esmolol is an ultra-short acting beta 1 cardio selective adrenergic blocker. Esmolol has negative dromotropic effect on heart. As a result, the heart rate and blood pressure decreases. It has rapid onset of action and is effective in attenuating sympathetic responses to laryngoscopy and endotracheal intubation.

Clonidine is an imidazoline derivative and is centrally acting alpha 2 adrenoreceptor agonist. It decreased central sympathetic outflow by increasing the reuptake of nor-adrenaline by stimulation of pre synaptic alpha 2 adrenoreceptors. Premedication with clonidine was shown to blunt the stress response to the surgical stimuli and also decreased anaesthetic requirements.

Aims and Objectives

The aim of the present study is

To compare the effect of intravenous Esmolol and Clonidine on the hemodynamic response among patients undergoing endotracheal intubation in elective surgeries.

The objectives of present study are

To compare hemodynamic response to laryngoscopy and endotracheal intubation, in terms of:

- Heart Rate (HR)
- Systolic Blood Pressure (SBP)
- Diastolic Blood Pressure (DBP)
- Mean Arterial Pressure (MAP)
- Oxygen saturation (SpO2)

MATERIALSANDMETHODS

Design: Prospective randomized study.

Inclusion Criteria

- Age 18 to 50 years
- ASA grade I, II AND III
- Elective surgery

Exclusion Criteria

- Patients with ASA physical status above III
- Patient's refusal
- Known to drug allergy
- Patients with anticipated difficult intubation

Method: Preoperative history taking and clinical examination was done thoroughly on the day prior to the surgery.A detailed history was taken and Informed written consent was obtained from patients and their close relatives. All vital parameters were recorded continuously.

All patients were premedicated with Inj Ondansetron 0.08 mg/kg Iv and Inj Glycopyrrolate 0.004 mg/kg IV.

All patients were randomly allocated in 2 groups, each having thirty patients and receives:

GROUP C: I.V Clonidine 1.5 mcg/kg over 10 minutes before intubation.

GROUP E: I.V Esmolol 1.5 mg/kg over 2 minutes before intubation.

All patients preoxygenated with 100% oxygen for 3 minutes and induction done with inj. Propofol 2mg/kg IV and succinyl choline 2mg/kg was given as muscle relaxant. After confirmation of intubation, as muscle relaxant Inj Atracurium 0.5 mg/kg IV was given as loading dose and Inj Atracurium 0.1 mg/kg IV was given as maintenance dose when required.

Anaesthesia was maintained by assisted ventilation with 50% Oxygen (O2) + 50% Nitrous Oxide (N2O) + Sevoflurane and all vital parameters were recorded.

- At the end of the surgery, the residual neuromuscular blockade was reversed with Inj Glycopyrrolate 0.008 mg/kg IV and Inj. Neostigmine 0.05 mg/kg IV.

RESULTS

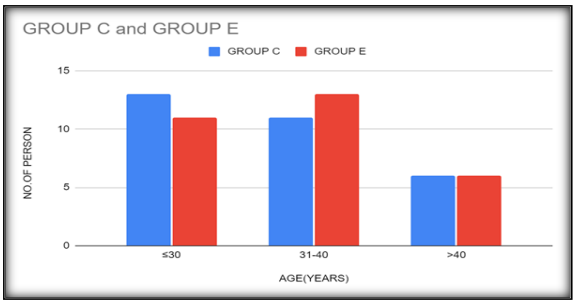

Figure 1: Age and weight distribution

All parameters were recorded at Base line, After study drug, Immediate after Intubation,1 min,1.5 min,2 min,2.5 min,3 min,5 min,7 min,10 min,15 min. The observations and results after studying 60 cases are summarised in tabulated form as described below.

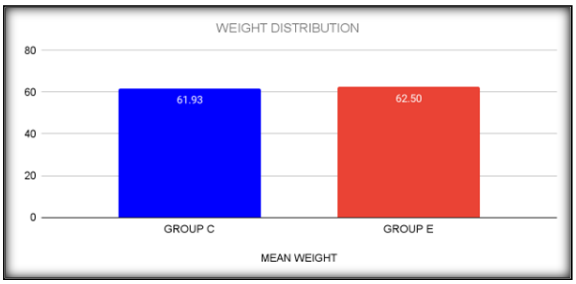

Figure 2: ?

This graph shows that no significant difference was seen in age and weight distribution of patients between both the groups (p>0.05).

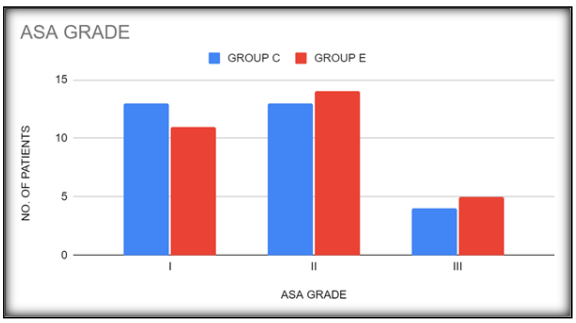

Figure 3: comparison of ASA grade

The above graph shows that no significant difference was seen with respect to ASA grade distribution of patients between both the groups (p>0.05)

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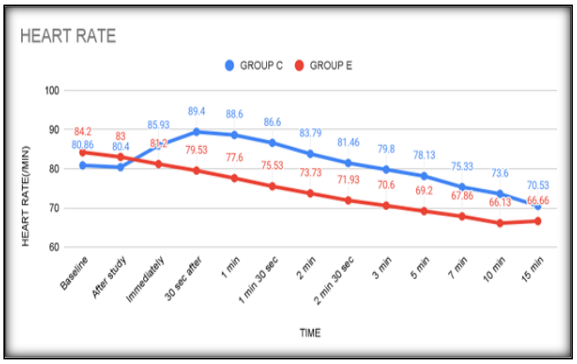

Figure 4: heart rate

The above graph shows that there was statistically significant difference between both the groups in view of mean heart rate. They had comparable mean HR values at baseline and after study drug (p>0.05), The mean HR values comparable immediately after intubation(p<0.05) and the difference of significant value increased after intubation (p<0.001). Thereafter, the mean HR decreased gradually in group E and also decreased gradually in group C (p<0.001).

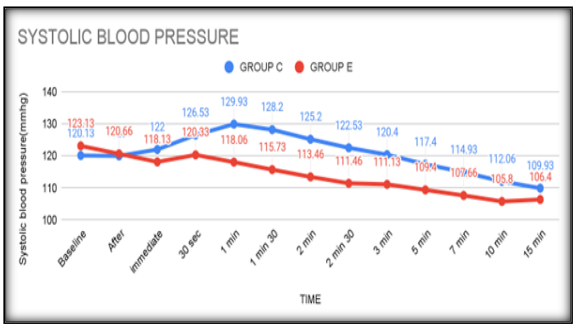

Figure 5: Systolic Blood Pressure

The above graph shows that there was a statistically significant difference between both the groups in terms of mean systolic blood pressure. They had comparable mean SBP at baseline and after study drug (p>0.05) and the difference of significant value increased after intubation (p<0.001). Thereafter, the mean SBP decreased gradually in group E and also decreased gradually in group C (p<0.001).

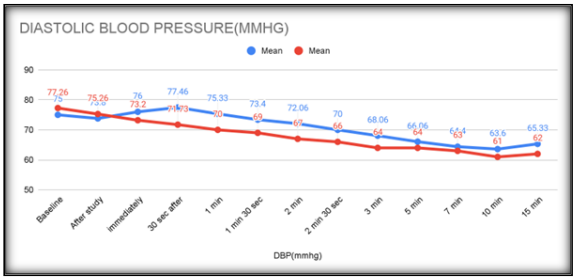

Figure 6: Diastolic Blood Pressure

The above graph shows that there was a statistically significant difference between both the groups in terms of mean diastolic blood pressure. They had comparable mean DBP at baseline and after study drug (p>0.05) and the difference of significant value increased after intubation (p<0.001). Thereafter, the mean DBP decreased gradually in group E and also decreased gradually in group C (p<0.001).

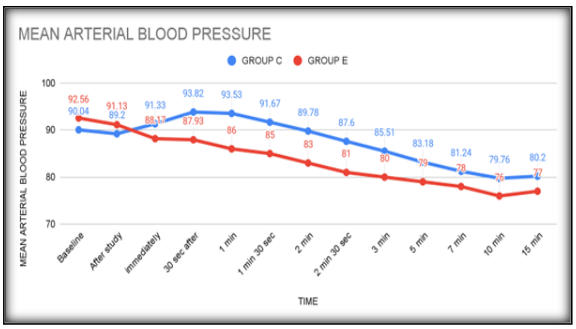

Figure 7: Mean Arterial Pressure

The above graph shows that there was a statistically significant difference between both the groups in terms of mean arterial pressure. They had comparable mean MAP at baseline and after study drug (p<0.05) and the difference of significant value increased at intubation (p<0.001). Thereafter, the mean MAP decreased gradually in group E and also decreased gradually in group C (p<0.001).

DISCUSSION

Graph I which shows age and weight distribution described that Mean age was 32.8 ± 9.44 years in Group C and 33.54 ± 8.60 years in Group E. P value was 0.754. The difference is statistically non - significant (p>0.05). While, mean weight was 61.9 ± 7.36 kg in Group C and 62.5 ± 8.30 kg in Group E. P value was 0.781 so the difference was statistically non - significant (p>0.05).[1]

Graph II which shows comparison of ASA grade described that the number of patients with ASA grade I were 13 (43.33%) in group C and 11 (36.66%) in group E. The number of ASA grade II patients were 13 (43.33%) in group C and 14(46.67%) in group E. The number of ASA grade III patients were 4 (13.33%) in group C and 5 (16.66%) in group E. P value was 0.928 so the difference was statistically non-significant (p>0.05).[2]

Alka Lunia et al, performed a study in which comparison of demographic parameters was done and they were statistically not significant (p>0.05).[3]

Graph III which shows heart rate described that the baseline mean HR was comparable in both the groups.Similarly after premedication, there was no statistical significance between the two groups (p>0.05).Immediately after intubation, the mean HR increased from baseline in group C and Decreased from baseline in group E. The difference was statistically significant (p<0.05).The increase was 6.27% in group C and the decrease was 3.56% in group E. After 30 seconds of intubation, the mean HR increased gradually in group C and decrease gradually in group E.The increase was4.03% in group C and the decrease was 2.05% in group

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E.After 1 min of intubation, the mean HR decreased gradually in group C and also in group E. The P value at 1, 2, 3, 5,7,10,15 minutes was <0.001 which was statistically highly significant in both group E and in group C. So the decreased in HR from baseline was more in group E.[4]

Zalunardo et al,who studied clonidine at a dose of 3µg/kg noted that HR increased by 23/min in the control group and by only 6/min in the clonidine pre-treated group.[5]

Rama Rao V M, Nageswara Rao Murupudi et al, concluded that the maximum rise in heart rate was in 1st minute after intubation and thereafter at 3rd, and 5th minute after intubation, it began to fall. The rise in HR was more in the Lidocaine group as compared to the Esmolol group, which is statistically significant (p value<0.05) during 1st, 3rd and 5th minute after laryngoscopy and intubation and it is consistent with our study results.

Graph IV which shows systolic blood pressure described that the baseline mean SBP was comparable in both the groups. Before intubation, there was no statistical significance between the two groups (p>0.05). Immediately after intubation, mean SBP increased from baseline in group C and decreased in group E. The difference was statistically significant (p<0.05). The increase was 1.55% in group C and the decrease was 4.06% in group E. After 30 sec of intubation, mean SBP increased in both the groups and the difference was statistically highly significant (p<0.001). The increase was 3.71% in group C and 1.86% in group E. Hence, the increase was maximum in group C. At 1 min after intubation there was increased mean SBP in group C and decreased in group E. The increase was 6.5% in group C and decrease was 0.06% in group E.At 2, 3, 5, 7, 10, 15 minutes, mean SBP decreases gradually in group C and group E.The results were statistically highly significant (p<0.001) at 1, 2, 3, 5, 7, 10 min in both groups., while they were statistically significant at 15 minutes (p<0.05). So the decreased in mean SBP from baseline was more in Group E.

Chandrashekharappa K et al, observed in their study that Systolic Blood pressure increase in control group from (119.5 ± 9.1) mmhg to (135.0 ± 12.1) mmhg during intubation, while there was no increase in SBP in Clonidine (1.5µg/kg) group(122.5 ± 16.2) mmhg rather it remained lower than baseline value (124.1 ± 11.7) mmhg which it highly significant (p<0.05).

Dipali Singh,Sarhyanarayanjagannath et al, observed in their study a combination of dexmedetomidine (1µg/kg) and esmolol (2mg/kg)group has beneficial effect on HR and arterial blood pressures.The SBP in dexmedetomidine retained lower than baseline value ith highly significant(p<0.05).

Graph V which shows diastolic blood pressure described that the baseline mean DBP was comparable in both the groups at the start of our study. Similarly before intubation, there was no statistical significance between the two groups (p>0.05). Immediately after intubation, mean DBP increased from baseline in group C and decreased in group E. The difference was statistically significant (p<0.05).The increase was 1.33% in group C and decrease was 5.25% in group E. At 30 seconds after intubation, mean DBP increased in group C and decreased in group E. The difference was statistically highly significant (p<0.001). The increase was 1.92% in group C and 2.00% in group E. At 1, 2, 3, 5,7,10,15 minutes, mean SBP decreasesd gradually in group C and group E.The results were statistically significant (p<0.05). So the decreased in mean DBP from baseline was more in Group E.

Matot I et al,also observed a significant increase in Diastolic Blood Pressure in the placebo group (increasing from 80 ± 11 to 97 ± 14mmhg) compared with the baseline and with the clonidine group which showed minimal rise.

Rama Rao V M, Nageswara Rao Murupudi et al, concluded that the rise in SBP & DBP was more in the Lidocaine group as compared to the Esmolol group, which is statistically significant (p value<0.05) during 1st, 3rd and 5th minute after laryngoscopy and intubation and it is consistent with our study results.

Graph VI which shows mean arterial pressure described that the baseline mean MAP was comparable in both the groups. Before intubation, there was statistical significance between the two groups (p<0.05).Immediately after intubation, mean MAP increase from baseline in group C and decreased in group E. The increase was 1.45% in group C and decrease was 4.74% in group E.The difference was statistically significant (p<0.05). After 30 seconds of intubation, mean MAP increased in group C and decreased in group E. The difference was statistically highly significant (p<0.001). The increase was 2.72% in group C and decrease was 0.27% in group E. At 1, 2, 3, 5,7,10 ,15 minutes, mean MAP decreased gradually in group C and group E.The results were statistically significant (p<0.05). So the decreased in mean MAP from baseline was more in Group E.

Acharya N et al,[2]observed in his study that following laryngoscopy and intubation at 1 min after intubation in the control group MAP increased by 24.5mmhg and in the Clonidine group MAP increased by 8.7mmhg and this is statistically highly significant (p<0.001).

Bandana Paudel, Samir Ghimire, Sumitra Paudel et al, concluded that the rise of MAP was more in the Lidocaine group (single dose Lidocaine administered) as compared to the Esmolol group (single dose Esmolol administered), which is statistically significant (p value<0.001) during 1st, 3rd and 5th minute after laryngoscopy and intubation and it is consistent with our study result.

Oxygen saturation was measured constantly in our study along with various haemodynamic parameters. All the patients in our study had normal arterial

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saturation throughout the study. No patient in any group had desaturated (SpO2 <95%) perioperatively.

CONCLUSION

From the present study it is evident that both IV Esmolol (1.5mg/kg) and IV Clonidine (1.5mcg/kg) before induction of anaesthesia are safe and effective in attenuating the hemodynamic responses to laryngoscopy and endotracheal intubation but Clonidine shows better hemodynamic stability when compared to Esmolol. Clonidine attenuates pressure response for long duration in comparison to ultra short acting Esmolol.

Esmolol is preferable in patients with cardiovascular pathology, tachycardia, arrhythmias whereas, Clonidine is preferable in hypertensive and anxious patients.

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