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TO COMPARE THE EFFICACY OF LIGNOCAINE AND ESMOLOL FOR ATTENUATION OF STRESS RESPONSE TO LARYGOSCOPY & ENDOTRACHEAL INTUBATION

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A B S T R A C T

Laryngoscopy and intubation are mandatory for most patients undergoing operation under general anaesthesia, which is invariably associated with certain cardiovascular changes such as tachycardia or bradycardia, rise in blood pressure and a wide variety of cardiac arrythmias. 100 patients belonging to ASA I or II undergoing various elective surgeries were randomly allocated to two groups of 50 each.Group A received2 mg/kg esmolol& Group B received 1.5 mg /kg preservative free lidocaine IV 2 min before intubation. The heart rate, systolic blood pressure, Diastolic blood pressure, Mean arterial pressure were recorded continuously after giving preanaesthetic medication till ten minutes after intubation. It was observed that esmolol is more effective than lignocaine in attenuating rise in heart rate following laryngoscopy and intubation. Also the rise in blood pressure was suppressed by bolus dose of esmolol (2 mg/kg).

INTRODUCTION

Hypertension and tachycardia have been reportedduring intubation under light anaesthesia.[1,2] Cardiovascular complications are one of the most common causes of anesthesia-related morbidity and mortality.[3]

Increase in blood pressure and heart rate occurs most commonly from reflex sympathetic discharge in response to laryngotracheal stimulation, which in turn leads to increased plasma norepinephrine concentration. These changes may be fatal in patients with heart disease and high blood pressure.[4] During recovery from anaesthesia hypertension may occur provoking post operativecomplications like bleeding, increased intracranial and intraocular pressure.Various pharmacological approaches have been used to attenuate the pressure responses to laryngoscopy and tracheal intubation.various techniques like topical and intravenous Lignocaine,[5]opioids[6,7] deep inhalational anaesthesia, adrenergic blockers, vasodilators like sodium nitroprusside, nifedipine have been used so far to attenuate the stress response to larygnoscopy& intubation. Antihypertensive agents like phentolamine. Sodiumnitroprusside and nitroglycerine are effective but requires continuous intra arterial blood pressure monitoring.Ca-channel blockers are also preferred because myocardialdepression produced by it is minimised by reduction inafterload so that cardiac output remain unchanged, butthey have no effect on increase in heart rate.

Esmolol, an ultra short acting cardioselective betablocker with its unique pharmacokinetic profile is a naturalchoice for this purpose.

MATERIALS AND METHODS

The present study was conducted in 100 patients belonging to ASA I or IIundergoing various elective surgeries after obtaining written informed consent from patients and permission from hospital ethical committee.

Inclusion Criteria

- Patients in the age group of (15-65yrs) undergoing elective surgeries under general anaesthesia.
- ASA I or II
- Oropharyngeal anatomy of Mallampati class I
- Any operation other than cardiac surgery performed under general anesthesia with endotracheal intubation.

Exclusion Criteria

- ASA III or more
- Known allergy to trial drugs
- Morbidly obese
- Patients with cardiovascular disease
- Heart rate < 60 beats per minute (bpm)
- Basal SBP < 100 mm Hg
- Conditions such as bronchial asthma, diabetes mellitus.

All patients were randomly allocated to two groups of 50 each.

ESMOLOL GP- Group (A) Esmolol (2mg/kg)

LIGNOCAINE GP-Group (B) Lignocaine (1.5mg/kg)

Intravenous access was secured and infusion of Ringer's lactate solution started All the patients were premedicated with injection glycopyrrolate 0.004mg/kg forty five minutes

prior to induction of anaesthesia. Heart rate, systolic and diastolic blood pressure was recorded as baseline value.

Patients were then shifted to the operating room after which routine non-invasive monitors were applied and vital signs monitored. All patients were given inj. Fentanyl (2μg/kg) as premedication. Patients were pre-oxygenated with four to five breaths of 100% oxygen. After induction of General Anaesthesia with thiopentone sodium (6mg/kg) andvecuronium bromide (0.12mg/kg), the test drug was given two minutes before tracheal intubation. Anaesthesia was maintained with sevoflurane in oxygen through Bain's circuit on controlled ventilation. Muscle relaxation was done with intermittent doses of vecuronium bromide.At the end of surgery reversal was done with neostigmine0.05mg/kg andglycopyrrolate 0.008mgkg.

HR, SBP, DBP, MAP, RPP (rate pressure product), SpO_2 (oxygen saturation), and ECG (electrocardiogram) changes were recorded before induction, immediately aftertracheal intubation and at 1, 3 and 5 min after tracheal intubation.

OBSERVATION AND RESULTS

Table 1 Demographic Data

Parameter	Group A	Group B	P-Value
Age (yrs) Mean± S.D	58.32±8.86	51.42±4.21	0.08
Sex (M:F)	23:27	26:24	0.21
Weight (Kg) Mean± S.D.	72±15.81	64±12.87	0.41

Table 1 shows that both groups were comparable with respect to age, weight & sex ratio without any statistically significant difference.

Table 2 Duration of Surgery

Duration of Surgery	Group A	Group B	P-Value
Time(in minutes) mean ±S.D	112.28±20.32	142.61±23.82	0.02

Table 2 shows there was no statistically significant difference with regard to duration of surgery between the two groups.

Table 3 Haemodynamic Parameters

Parameter	Basal		At Intubation		1 Minute		3 Minutes		5 Minutes	
	Gp A	Gp B	Gp A	Gp B	Gp A	Gp B	Gp A	Gp B	Gp A	Gp B
Heart Rate	84.6± 9.32	87.5±8.86	90.2±5.63	95±7.71	100.5±8.2	110.7±5.4	98.6±7.6	105.6± 7.4	91.5± 8.5	94.3± 5.7
SBP	124± 18.84	118± 10.62	131± 20.91	135± 18.87	136± 15.57	142± 13.37	129± 10.83	138± 8.65	122± 6.64	133± 8.59
DBP	82± 7.72	79±9.81	86±6.41	88±5.43	90±6.71	94±4.05	87± 6.02	90± 7.81	85±5.86	88±4.08
MAP	68± 9.87	64±8.76	74± 9.08	70±7.92	84±5.91	75±8.71	82± 6.51	78±4.56	79±6.68	73± 6.49

Table 3 shows the comparison between haemodynamic parameters in between the two groups at various intervals. The mean heart rate in esmolol group was 90.2±5.63/min, 100.5±8.2/min, 98.6±7.6/min & 91.5±8.5/min at intubation, after 1 min, after 3 min and after 5 minutes respectively while the mean heart rate in lignocaine group was 95±7.71/min, 110.7±5.4/min, 105.6±7.4/min & 94.3±5.7/min at intubation, 1 min, 3 min & 5 minutes respectively. The difference was statistically significant. (P>0.5)

The mean SBP in esmolol group was 131±20.91mm of Hg, 136±15.57mm of Hg, 129±10.83mm of Hg & 122±6.64 at intubation, after 1 min, after 3 min and after 5 minutes respectively while the mean SBP in lignocaine group was 135±18.87 mm of Hg, 142±13.37mm of Hg, 138±8.65 mm of Hg & 133±8.59 mm of Hg at intubation, 1 min, 3 min & 5 minutes respectively. The difference was statistically significant. (P>0.5)

The mean DBP in esmolol group was 86±6.41mm of Hg, 90±6.71mm of Hg, 87±6.02mm of Hg & 85±5.86 at intubation, after 1 min, after 3 min and after 5 minutes respectively while the mean DBP in lignocaine group was 88±5.43 mm of Hg, 94±4.05mm of Hg, 90±7.81 mm of Hg & 88±4.08 mm of Hg at intubation, 1 min, 3 min & 5 minutes respectively. The difference was statistically significant. (P>0.5)

The MAP in esmolol group was 74±9.08mm of Hg, 84±5.91mm of Hg, 82±6.51mm of Hg & 79±6.68 mm of Hg at intubation, after 1 min, after 3 min and after 5 minutes respectively while the MAP in lignocaine group was 70±7.92 mm of Hg, 75±8.71mm of Hg, 78±4.56 mm of Hg & 73±6.49 mm of Hg at intubation, 1 min, 3 min & 5 minutes respectively. The difference was statistically significant. (P>0.5)

DISCUSSION

Laryngoscopy and intubation are mandatory for most patients undergoing operation under general anaesthesia, which is invariably associated with certain cardiovascular changes such as tachycardia or bradycardia, rise in blood pressure and a wide variety of cardiac arrythmias. These effects are deleterious in susceptible individuals culminating in perioperative myocardial ischaemia, acute heart failure and cerebrovascular accidents. Various methods to attenuate those responses have been tried.Beta Blockers minimize the increase in heart rate and blood pressure by attenuating positive chronotropic and ionotropic effects of the increase in adrenergic activity.

Esmolol possesses several properties which makes it a valuable agent to obtund the cardiovascular response. Firstly it is a cardio selective agent. Secondly, it has ultra short duration of action (9minutes) and finally, significant drug interaction with commonly used anesthetics have not been reported[8].

The present clinical study was undertaken to evaluate the effect of two drugs. ESMOLOL & LIGNOCAINE. Study was done in 2 groups. In group a patients received Esmolol& group B patients received Lignocaine. Findings of both groups are discussed in comparison with their pre-operative values at different time intervals with regard to heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure.

The mean heart rate in esmolol group was 90.2±5.63/min, 100.5±8.2/min, 98.6±7.6/min & 91.5±8.5/min at intubation, after 1 min, after 3 min and after 5 minutes respectively while the mean heart rate in lignocaine group was 95±7.71/min, 110.7±5.4/min, 105.6±7.4/min & 94.3±5.7/min at intubation, 1 min, 3 min & 5 minutes respectively. The difference was statistically significant. (P>0.5) our findings are consistent with finding the**Korpinen*et al*** **and Shroff *etal*.**[9,10]

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Hg & 133±8.59 mm of Hg at intubation, 1 min, 3 min & 5 minutes respectively. The difference was statistically significant. (P>0.5) of **Shree *et al*** conducted a similar study and concluded that lignocaine showed lesser attenuation of hemodynamic variables as compared to esmolol.[11]

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Korpinen *et al* conducted a similar study in 1998 and reported that the administration of esmolol bolus 2 mg kg^{-1} IV 2 min before laryngoscopy and intubation suppressed the increase in the heart rate rather than arterial blood pressures.[12]

Bostana and Eroglu in 2012 reported that IV esmolol in dose of 1 mg kg^{-1} before intubation was effective in suppressing the heart rate and arterial blood pressure. [13]

Kumar *et al* in 2003 have also claimed optimal results while using higher doses of esmolol in Asian population, i.e., 2 mg kg^{-1} without any incidence of unplanned hypotension or bradycardia.[14]

CONCLUSION

From the above study it can be concluded that intravenous ESMOLOL (2mg/kg) is more effective than intravenous Lignocaine (1.5mg/kg) for attenuation of cardiovascular stress response to larygoscopy and intubation without any deleterious effects.

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