ISSN 2515-8260 Volume 08, Issue 04, 2021

To Evaluate And Compare The Efficacy Of IV Esmolol And IV Lignocaine In Blunting The Hemodynamic Response To Laryngoscopy And Intubations.

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Abstract:

Background&Method: The study was conducted with aim to evaluate and compare the efficacy of IV esmolol and IV lignocaine in blunting the hemodynamic response to laryngoscopy and intubationsat Sanjay Gandhi Medical College, Rewa, M.P. In the operating room the patients was transferred to the operating table. An intravenous infusion with saline 0.9% was started using 18 G cannula in a peripheral vein. Blood pressure monitored by manual cuff. A pulse oximeter was placed on the finger. ECG monitoring was also established. A central venous line placed in the cubital vein using a 375 cava fix and a 0.9% normal saline was started. Baseline heart rate and blood pressure were recorded. Random allocation of patients to each group was done lots drawn by a person not taking part in the study. The investigator that is the person doing the study was unaware of the drug used.

Result: The difference between the groups in distribution of age (p=0.6), weight (p=0.7) and sex (p=0.8) were not statistically significant. In duration of laryngoscopy and intubations was not statistically significant. (P=0.5).In grades of laryngoscope was not statistically significant (P= 0.51). In experience of anesthetist was not statistically significant. (P=0.37).

Conclusion: Esmolol and lignocaine are both similar in their effectiveness in attenuating the haemodynamic response to laryngoscopy and intubation's, but they do not abolish it completely. More studies need to be carried out to confirm the perception that esmolol in combination with the newer narcotic agents like fentanyl may abolish the haemodynamic response to laryngoscopy and intubations, particularly required in the patients in whom a single hyper dynamic response may be catastrophic.

Keywords: IV esmolol and IV lignocaine, hemodynamic, laryngoscopy and intubations.

Study Designed: Observational Study.

ISSN 2515-8260 Volume 08, Issue 04, 2021

1. INTRODUCTION

Esmolol given as a bolus injection or infusion prior to intubations significantly attenuates haemodynamic responses to surgical stress. For example, in one study, 30 ASA (American society of Anesthesiologists) grade I / II patients were treated with a continuous intravenous infusion of esmolol (loading dose , 500 micro gm/ kg/ min for 2 minutes , maintenance, 100 microgm/kg/minutes until 5 minutes after intubations) or normal saline before induction of anesthesia and tracheal intubations.Esmolol treated patients had significant decrease in heart rate during the pre-induction period, compared with controls (-16% vs. 0%, $p< 0.001$)[1]. After intubations, heart rate increased to a similar extent in both groups, although the maximum value for this parameter was significantly lower in the esmolol group (92 vs. 110 beats / min , $p < 0.05$). Similarly, esmolol treated patients versus controls had significantly lower mean maximum values for systolic blood pressure (151 vs. 188 mmHg, $p< 0.01$) and rate pressure product (13,393 vs. 19,947 beats/min mmHg, $p<0.001$) [2].

In a comparative study in 80 ASA grade II –IV patients undergoing endotracheal intubations, esmolol 150 mg provided better protection against tachycardia than lignocaine 200 mg and fentanyl 200 microgm . Mean percentage increases in heart rate were similar in the placebo (44%), lignocaine (51%) , and fentanyl (37%) groups , but significantly lower in the esmolol group (18% , $p< 0.05$ vs. other groups). Percentage increases in maximum systolic blood pressure were similar for all 3 active treatment groups (esmolol 19% , fentanyl 12% , lignocaine 20%) ,and were significantly ($p< 0.05$) less than the increase noted in the placebo group (36%). Thus, although fentanyl and lidocaine were as effective as esmolol in restricting perioperative increases in blood pressure, only esmolol provided consistent and reliable protection against increases in both heart rate and systolic blood pressure accompanying laryngoscope and intubations[3].

There has been considerable debate about the appropriate dose and optimal time of administration of esmolol in anaesthetized patients[4]. The dose of esmolol recommended by the United States food and drug administration for the treatment of tachycardia in non – anaesthetized patients is 500 microgm/kg/min given as an intravenous infusion. Gold et al proposed that a single bolus injection of esmolol 50 to 100 mg (approximate 750- 1500 microgm/kg) was effective in treating intraoperative tachycardia. However, considerably lower dose (single bolus injection of 10 mg, equivalent to 150 microgm/kg in a 70 kg patients) were advocated by Ford, especially in elderly patients, who may be at greater risk of developing severe bradycardia and hypotension than their younger counterparts[5].

The effects of high bolus doses of esmolol, sufficient to blunt both heart rate and blood pressure increases induced by intubations , have been investigated in several studies. For example, a Canadian multicentre study of 548 patients showed that esmolol 100 mg, administered as a single intravenous bolus prior to the induction of anesthesia significantly reduced the incidence of intubations induced tachycardia (heart rate > 110 beats /min), increasing the dose of esmolol to 200 mg produced no further reduction in the incidence of tachycardia. The need for high bolus doses of esmolol to effectively control increased blood pressure during intubations has also been reported in other studies. In one of these trials, esmolol caused a marked reduction in the incidence of ventricular arrhythmias, but it did not significantly prevent the hypertensive response to intubations[6].

2. MATERIAL & METHOD

The study was conducted at Sanjay Gandhi Medical College, Rewa, M.P. from duration Dec 2020 - Nov 2021. In the operating room the patients was transferred to the operating table. An intravenous infusion with saline 0.9% was started using 18 G cannula in a peripheral vein. Blood pressure monitored by manual cuff. A pulse oximeter was placed on the finger. ECG monitoring was also established. A central venous line placed in the cubital vein using a 375 cava fix and a 0.9% normal saline was started. Baseline heart rate and blood pressure were recorded.Random allocation of patients to each group was done lots drawn by a person not taking part in the study. The investigator that is the person doing the study was unaware of the drug used.Induction and intubations sequence was carried out as below:
The study was done on 60 patients. They were divided into 2 groups. Group I patients received esmolol for attenuating the laryngoscope and intubations response and group II received lignocaine for the same.

Inclusion Criteria:

1. Patients posted for elective surgery under general anesthesia.
2. ASA Grade I –II patients.
3. Age between 20- 65 years.
4. Hb at or above 10 gm%.
5. Procedure in supine, prone or lateral position.

Exclusion Criteria:

1. Patients with cardiovascular, respiratory or renal disease.
2. Patients with diabetes mellitus.
3. Patients taking drugs known to affect blood pressure and heart rate.
4. Blood pressure during the preoperative visit above 100 mm/ Hg diastolic.
5. Patients with neurological deficit who have altered sensorium.

3. RESULTS

TABLE 1: Shows the demographic distribution in both the groups.

S. No.		**Group I esmolol (n=30)**	**Group II (n=30)**
1.	Mean age	37.05	38.70
2.	Mean weight	58.64	58.89
3.	Sex : M/F	19/11	17/13

The difference between the groups in distribution of age (p=0.6) , weight (p=0.7) and sex (p=0.8) were not statistically significant.

Table 2: Duration Of Laryngoscope And Intubation

	Group I ESMOLOL (n=30)		**Group II LIGNOCAINE (n=30)**	
	N.O.	%	N.O.	%
< 15 SEC	19	70	19	70
> 15 SEC	11	30	11	30

The difference between the groups in duration of laryngoscopy and intubations was not statistically significant. (P=0.5).

Table 3: Laryngoscope View Grading

	Group I ESMOLOL		**Group II LIGNOCAINE**	
	N.O.	%	N.O	%
Grade I	2376.6		2480	
Grade II	0516.6		0620	
Grade III	02 6.8		0000	

The difference between the groups in grades of laryngoscope was not statistically significant (P= 0.51)

Table 4: Experience of anesthetist

	Group I ESMOLOL (n=30)		**GROUP II LIGNOCAINE (n=30)**	
	N.O.	%	N.O.	%
< 1 YEARS	00	00	03 10	
< 2 YEARS	16	53.3	11	36.7
> 2 YEARS	14	46.7	1653.3	

The difference between the groups in experience of anesthetist was not statistically significant. (P=0.37).

4. DISCUSSION

Several studies have evolved to blunt the haemodynamic responses to tracheal intubations. These have included the use of narcotics, lignocaine and beta blockers. Each of these techniques has advantages and disadvantages of its own[7]. Large doses of narcotics may lead to post operative respiratory depression and vasodilators may produce hypotension resulting in coronary hypo perfusion.

Esmolol is a relatively new beta blocking agent with several desirable properties, it is cardio selective and short acting .These characteristics make it ideally suited for use in the perioperative period. Many studies have established the effectiveness of esmolol infusion in the prevention of haemodynamic alterations following tracheal intubations. Few have examined the effectiveness of esmolol in bolus doses on the same setting[8].

Reflex responses to endotracheal intubations are a potential hazard to patient with compromised intracranial compliance from neuropathological process and in patients where hypertension and tachycardia can be detrimental. Uncontrolled coughing can result in a marked increase in intrathoracic and intra abdominal pressure. When this pressure is transmitted to the cerebrospinal fluid in patients with hydrocephalus or intracranial mass lesion, the increase in CSF pressure may produce a transient impairment of cerebral perfusion[9].

The percentage change in the heart rate, between the pre induction and post intubation's was 18.45% in the esmolol group. This result is very similar to the findings of Helfman who in 1991 reported a 18 % change in the heart rate after esmolol.Though this represents an increase in the

heart rate following laryngoscopy and intubation's, this change qualifies to be described as attenuation in the response of laryngoscope and intubation's when compared with placebo group in the study by Helfman. They demonstrated a 44% increase in the heart rate when neither esmolol or fentanyl was given before laryngoscope and intubations[10].

5. CONCLUSION

Esmolol and lignocaine are both similar in their effectiveness in attenuating the haemodynamic response to laryngoscopy and intubation's, but they do not abolish it completely. More studies need to be carried out to confirm the perception that esmolol in combination with the newer narcotic agents like fentanyl may abolish the haemodynamic response to laryngoscopy and intubations, particularly required in the patients in whom a single hyper dynamic response may be catastrophic.

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