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A COMPARATIVE EVALUATION OF INTRAVENOUS ESMOLOL, LIGNOCAINE AND LIGNOCAINE 10% SPRAY IN ATTENUATING CARDIOVASCULAR RESPONSE TO LARYNGOSCOPY AND INTUBATION.

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ABSTRACT

Objectives: To observe the cardiovascular changes, to study the magnitude of changes in normotensive patients and to observe the effects in attenuating the cardiovascular responses to laryngoscopy and intubation comparing three drugs. **Methods:** The study was carried out on 120 adult patients of either sex, in the age group 20-60 years Patients were divided into 4 groups of 30 patients each. Depending upon the drugs employed to attenuate the cardiovascular responses during laryngoscopy and intubation, Patients were randomly allocated to either group. ***Group I*** - The patients of this group received only normal saline and served as control group. ***Group II*** – The patients of this group received i/v injection 2% lignocaine hydrochloride 1.5 mg/kg body weight 2 minute before intubation. ***Group III*** – The patients of this group received 10% lignocaine spray 1.5mg/kg body weight laryngeotracheal just before intubation. ***Group IV*** –The patients of this group received i/v Esmolol 1.5mg/kg body weight 2 minute before intubation. The observations were made at 1min., 3 min., 5 min., and at 10 minutes interval. **Results:** The result obtained from our study with this drug found that both i/v esmolol and i/v lignocaine an effective in controlling both SBP and DBP but not by the lignocaine 10% spray. **Conclusions:** Esmolol were more effective than i/v lignocaine in attenuating the both SBP and DBP. While in PR only esmolol was found effectively significant and rest other not significant. Esmolol, at an intravenous bolus dose of 1.5mg/kg, "provided consistent and reliable protection against increases in both HR and BP accompanying laryngoscopy and intubation."

KEYWORDS: Esmolol, lignocaine, laryngoscopy.

INTRODUCTION

The day of 16 October 1846 witnessed the moment, when **WTG Morton** of Boston USA gave world, first general anesthesia to Gilbert Abbott by giving ether. After then Chloroform replaced ether mainly by the efforts of Simpson. Horace Wells then introduce Nitrous oxide. Technical difficulties in administration of these agents were always present. The problem of maintaining airway leading to hypoxia was the ever-present danger. Successful administration without complications was mainly based on the skill and the experience of the person administering ether or chloroform. The most important discovery that completely revolutionized general anaesthesia was the development of endotracheal anaesthesia by Ivan W. Magill and E. Stanley Rowbotham (1920).

Endotracheal intubation demanded greater skill from the anaesthetist and required deeper planes of anaesthesia for successful intubation. The introduction of suxamethonium (1949), a short acting relaxant, greatly facilitated the intubation quickly and safely. With the introduction of muscle relaxants and new equipments in the anaesthetic practice coupled with ever growing technical knowledge and skills of anaesthetists, endotracheal intubation has now become a safe and common procedure in modern day anaesthesia.

As Other procedure Endotracheal intubation is also associated with some hazards. The complications commonly encountered are trauma during laryngoscopy, airway obstruction by kinking or malposititon of tube. Trauma to vocal cords leading to oedema and postoperative hoarseness or ulcerations are not uncommon. Beside these, there are certain cardiovascular disturbances, which often go unnoticed due to lack of proper monitoring. Cardiac Disturbances may be transient and may not lead to deleterious effects in normal healthy individuals but can lead to serious consequences in patients with cardiovascular diseases.

We are particularly interested in the cardiovascular complications arising during laryngosocpy and intubation. Transient disturbances in cardiac action are caused by reflex excitation of vagus nerve or sympathetic nervous system during larygoscopy and intubation. The effects of laryngoscopy and intubation on cardiovascular system can be readily overlooked during clinical anaesthesia as anaesthetist may become engrossed in the technical aspects of intubation.

The present study was desinged to determine whether the i/v lidocaine , i/v esmolol or 10% lidocaine spray is superior in it ability to attenuate the haemodynamic respose to intubation. The results of different group, will be compared to assess the efficacy of these drugs.

MATERIAL AND METHODS

The present study was conducted in N.S.C.B. Medical College and Hospital, Jabalpur. The study was carried out on 120 adult patients of either sex, in the age group 20-60 years. All the patients were normotensive and devoid of any cardiovascular disturbances, belonging to ASA grade I and II. The patients were picked up from the routine operative list scheduled to undergo various types of operating procedures like general surgical, gynaecological and orthopaedic.

To make the study more standardized, premedication, intubation, relaxant, duration of laryngoscopy were fixed for all cases. This was done so that the effects of the drugs used for study could be properly assessed and the results are valid and meaningful. In the present study, all the cases were premedicated with injection Midazolam 0.05mg/kg I/M half an hour prior to induction. Anxiety before operation can causes changes in pulse and blood pressure. Since the basic aim of the study was to observe cardiovascular response to laryngoscopy and intubation, therefore the patients in whom induction was stormy or where difficulty in laryngoscopy and intubation was anticipated were excluded from the study. Patients who required more than on attempt for intubation or where intubation was unduly prolonged were also not considered.

Systolic blood pressure, diastolic blood pressure, and heart rate were recorded by pulse oxymeter. Patients were divided into 4 groups of 30 patients each. Depending upon the drugs employed to attenuate the cardiovascular responses during laryngoscopy and intubation, Patients were randomly allocated to either group. The groups were designated as I, II, III and IV.

Group I - The patients of this group received only normal saline and served as control group.
Group II – The patients of this group received i/v injection 2% lignocaine hydrochloride 1.5 mg/kg body weight 2 minute before intubation.
Group III – The patients of this group received 10% lignocaine spray 1.5mg/kg body weight laryngeotracheal just before intubation.
Group IV – The patients of this group received i/v Esmolol 1.5mg/kg body weight 2 minute before intubation.

Blinding technique employed in the study was that the person recording the parameters like SBP, DBP, and PR was not aware as to which drug and dosage was administered.

All the patients were preoxygenated with 100% oxygen for three minutes. Technique of anaesthesia was standardized for all the patients in the study. This consisted of induction with I.V. thiopentone sodium (2.5%) 5 mg/kg BW followed by I.V. succinylcholine 1.5 mg/kg BW to facilitate endotracheal intubation. The paramenter like SBP, DBP, and PR were recorded every minute after ET till up to 10 min. All the observations made in this study were recorded in the specially prepared proforma for this study. Observations at different time periods were compared for each parameter with in the group and intergroup comparison was done. All the data obtained were analysed and subjected to statistical analysis for significance.

Table 1: Base line parameters of the cases. the baseline pulse rate, systolic bp and diastolic bp were almost equal and no statistically significant difference was observed (P>0.05).

Parameters	Group I	Group II	Group III	Group IV
PR	83.00 ±9.44	81.60 ± 8.67	83.37 ± 8.38	83.57 ± 7.50
SBP	124.47 ± 9.97	121.73 ± 10.85	121.8 ± 9.08	117.2 ± 8.48
DBP	79.20 ± 5.93	78.37 ± 5.99	78.20 ± 6.05	77.40 ± 5.80

Table 2: Comparision of Mean Pulse Rate at Different Time Interval.

Time	GROUP I (N=30)	GROUP II (N=30)	GROUP III (N=30)	GROUP IV (N=30)
Pre Op. Baseline	83.00 ±9.44	81.60 ±8.67	83.37 ±8.28	83.57 ±7.50
At 1 Min	120.60 ± 10.32	122.50 ±8.77	121.17 ±10.30	92.50 ±8.08

At 3 Min	116.80 ± 10.39	116.40 ±7.29	116.37 ±9.51	91.00 ±9.08
At 5 Min	111.73 ± 9.46	109.80 ±7.35	110.00 ±9.17	90.40 ±8.90

This table shows the mean values of pulse rate at different time interval from one minute to five minute after ET.

Table 3: Comparision of Mean Systolic Bloop Pressure at Different Time Interval.

Time	**GROUP I (N=30)**	**GROUP II (N=30)**	**GROUP III (N=30)**	**GROUP IV (N=30)**
Pre Op. Baseline	124.47 ±9.97	121.73 ±10.85	121.80 ±9.08	117.20 ±8.48
At 1 Min	171.43 ±18.23	155.87 ±8.91	164.20 ±11.43	140.80 ±16.47
At 3 Min	163.17 ±19.20	146.87 ±9.74	156.37 ±15.56	131.07 ±12.96
At 5 Min	144.20 ±14.96	125.13 ±11.11	137.27 ±13.56	116.93 ±12.74

Table 4: Comparision of Mean Diastolic Blood Pressure at Different Time Interval.

Time	**GROUP I (N=30)**	**GROUP II (N=30)**	**GROUP III (N=30)**	**GROUP IV (N=30)**
Pre Op. Baseline	79.20 ±5.93	78.37 ±5.99	78.20 ±6.05	77.40 ±5.80
At 1 Min	119.40 ±9.34	108.40 ±8.84	113.17 ±9.27	94.00 ±12.71
At 3 Min	109.07 ±9.68	97.37 ±9.45	103.57 ±11.22	87.67 ±10.90
At 5 Min	95.67 ±8.31	88.67 ±9.40	93.47 ±9.99	77.33 ±9.50

Table 4: At 1min.

Variation	**Gronp I**			**Gronp II**			**Gronp III**			**Gronp IV**		
	PR	**SBP**	**DBP**	**PR**	**SBP**	**DBP**	**PR**	**SBP**	**DBP**	**PR**	**SBP**	**DBP**
Fall 21-40	0	0	0	0	0	0	0	0	0	0	0	0
Fall <20	0	0	0	0	0	0	0	0	0	2 (6.7)	1 (3.3)	2 (6.7)
Nochange	0	0	0	0	0	1 (3.3)	0	0	0	0	0	4 (13.3)
Rise 1-20	2 (6.7)	0	0	0	6(20.0)	5 (16.7)	1 (3.3)	0	2 (6.7)	28 (93.3)	14 (46.7)	16 (53.3)
Rise 21-40	16 (53.3)	15 (50.0)	19 (63.3)	14 (46.7)	17 (56.7)	22 (73.3)	18 (60.0)	17 (56.7)	23 (76.7)	0	12 (40.0)	7 (23.3)
Rise 41-60	11 (36.7)	9 (30.0)	11 (36.7)	16 (53.3)	6 (20.0)	2 (6.7)	11 (36.7)	11 (36.7)	5 (16.7)	0	1 (3.3)	1 (3.3)
Rise 61-80	1 (3.3)	6 (20.0)	0	0	1 (3.3)	0	0	2 (6.7)	0	0	2 (6.7)	0
Mean ± SD	37.60 ±10.86	47.23 ±15.08	40.20 ±8.01	40.90 ±9.22	34.13 ±13.66	34.20 ±10.31	37.80 ±10.08	42.40 ±10.14	36.97 ±8.88	8.93 ±5.25	23.60 ±16.04	16.60 ±12.33

Table 5- At 2 min.

Variation	Gronp I			Gronp II			Gronp III			Gronp IV		
	PR	SBP	DBP	PR	SBP	DBP	PR	SBP	DBP	PR	SBP	DBP
Fall21-40		0	0		0	0		0	0		0	0
Fall <20	0	0	0	0	0	2 (6.7)	0	0	0	5 (16.7)	0	6 (20)
Nochange	0	0	0	0	0	0	0	0	0	0	0	0
Rise 1-20	5 (16.75)	5 (16.7)	6 (20.0)	4 (13.3)	18 (60.0)	18 (60.0)	4 (13.3)	12 (40.0)	12 (40.0)	24 (80.0)	23 (76.7)	19 (63.3)
Rise 21-40	18 (60.0)	17 (56.7)	23 (76.7)	17 (56.7)	12 (40.0)	10 (33.3)	22 (73.3)	15 (50.0)	14 (46.7)	1 (3.3)	4 (13.3)	2 (6.7)
Rise 41-60	7 (23.3)	7 (23.6)	1 (3.3)	9 (30.0)	0	0	4 (13.3)	2 (6.7)	4 (13.3)	0	0	0
Rise 61-80	0	1 (3.3)	0	0	0	0	0	1 (3.3)	0	0	0	0
Mean ± SD	33.8 ± 11.19	36.47 ±15.23	29.87 ±8.48	34.80 ±9.47	25.04 ±9.68	23.44 ±10.72	33.00 ±9.93	32.02 ±14.51	29.02 ±11.2	7.43 ±6.28	12.10 ±9.02	10.27 ±9.97

Similarly tables were made for 3, 4 & 5 min.; showing changes in pulse rate & blood pressure (systolic & diastolic) Their mean values and standard deviations work calculated and results obtained.

Statistics

It was ensured that all cases are between the age group of 20-60 years. The mean age of all the groups were comparable with no statistically significant difference ($p>0.05$) All the patients were between the 30-70 Kg ranges. The mean weight of all the groups was comparable and no statistically significant difference was observed ($p>0.05$). The Z value was calculated after calculating the mean and 'P Value was seen for the significance and result derived.

RESULT

The result obtained from our study with this drug found that both i/v esmolol and i/v lignocaine an effective in controlling both SBP and DBP but not by the lignocaine 10% spray. Esmolol were more effective than i/v lignocaine in attenuating the both SBP and DBP. while in PR only esmolol was found effectively significant and rest other not significant. Esmolol, at an intravenous bolus dose of 1.5mg/kg, "provided consistent and reliable protection against increases in both HR and BP accompanying laryngoscopy and intubation."

DISCUSSION

Endotracheal intubation is an essential tool in the anaesthetists armamentorium. This is a commonly performed procedure for administering general anaesthesia and resuscitative procedures. The endotracheal intubation offers numerous advantages which justify its applications in variety of situations. There is hardly any procedure which is devoid of drawbacks and this holds true for intubation also. One of the commonest drawback is the haemodynamic disturbances which have been reported are tachycardia, bradycardia, arterial hypertension, depression of ventricular ejection fraction and cardiac arrythmias. Theses changes were recognized and reported by king et al, 1951. These haemodynamic reactions which result due to sympathetic and parasympathetic stimulation may not be of any significance in healthy normotensive individuals but are potentially dangerous. Various methods have been recommended to attenuate theses cardiovascular responses.

In the present study 120 healthy patients free from any cardiovascular disease were studied. The main aim of the study was to observe the cardiovascular changes, to study the magnitude of changes in normotensive patients and to observe the effects in attenuating the cardiovascular responses to laryngoscopy and intubation.

The early works of Reid and Brace[1] and later of King et al[2], described the usual circulatory responses to laryngeal and tracheal stimuli in anaesthetized man as tachycardia and rise in arterial pressure. Laryngoscopy and intubation produces a significant increase in plasma nor adrenaline concentration. M.F. Cumming et al[3], which suggests an increase in the sympathetic, nerve activity during the procedure.

Transitory hypertension and tachycardia are probably of no consequence in healthy individuals, but either or both may be hazardous to those with hypertension, coronary insufficiency or cerebrovascular disease Forbes and Dally[4] have shown that rise of systolic pressure following endotracheal intubation may exceed 100 mm Hg. A rise in pressure of this order is potentially dangerous and may lead to left ventricular failure and cerebral Haemorrhage. B.D. King et al[2] described that reflex circulatory responses were marked when intubation was done under light general anaesthesia. The pressor response appeared to be more completely than the incrase in pulse rate by deep anaesthesia.

Forbes & Dally[4]; Yacoub-M Adi et al[5]; Miller et al[6] have confirmed the cardiovascular changes during laryngoscopy and intubation in normal healthy individuals. Besides rise in arterial pressure and heart rate, certain other effects viz. cardiac dysrrhythmias,

ectopic beats etc have also been reported by continuous ECG monitoring.

Prys Roberts et al,[7] used five different induction agents and neurolept analgesia in the hope that under its influence the hypertensive response to laryngoscpy would be attenuated but concluded that there was lack of stability during laryngoscopy although the percentage increase in arterial pressure following neurolept analgesia was less than with other agents. They suggested that further measures to prevent the occurrence of severe hypertensive crisis during intubation would be necessary.

Topical oropharyngeal anaesthesia produced by viscous lignocaine (Stoelting,[8], combination of translaryngeal block, superior laryngeal nerve block and laryngotracheal spray (King et al)[2], intratracheal spray with 4% lignocaine (Delinger)[9] have all been tried. But most of the methods required laryngoscopy, so were not effective as laryngoscpy itself produces similar response. Intravenous lignocaine (Hamill)[10] and deeper inhalational technique (King et al)[2] are used to modify the reponse at the central nervous system.

Splinter and Cervenko et al[11], demonstrated that 1.5 mg/kg of intravenous lidocaine could attenuate the increase in MAP and rate-pressure product, but not SBP, DBP, or HR. Yaqub-M N adi et al[5] compared 1.5 mg/kg of intravenous lidocaine with placebo in 30 patients and found that the mean increase in SBP was 10.3% for patients pretreated with lidocaine and 56% for patients receiving placebo; the mean increase in HR was 16.8% for patient pre-treated with lidocaine and 38.8% for patients receiving placebo.13 They concluded that lidocaine offered some protection to hypertension and tachycardia associated with laryngoscopy and intubation. A current recommendation for patients who have suffered head trauma and require intubation is to give lidocaine as an intravenous bolus at 1.5-2.0 mg/kg 3 minutes prior to intubation by Walls RM.[12] Other studies have questioned the efficacy of lidocaine to attenuate hemodynamic changes secondary to laryngotracheal stimulation by Splinter WM[11]; Miller CD[6]; Laurito CE[13]; Pathak D.[14]

Esmolol, a water-soluble, cardioselective, and ultra-short-acting ß-adrenergic antagonist, has also been shown to be effective in controlling both the HR and BP responses to intubation, but only in patients undergoing elective surgery studied by Helfman SM[15]; Kindler CH et al[16]; Kampine JP et al[17]; Parnass SM et al[18]; found in patients undergoing general anesthesia for elective surgery, that esmolol (loading dose of 500 µg/kg/min for 4 minutes, followed by a maintenance infusion of 300 µg/kg/min for 11 minutes) significantly attenuated the maximum increases in HR and BP when compared with placebo. Another study found that a single bolus dose of 100 or 200 mg was able to attenuate the hypertensive and tachycardic responses to laryngoscopy and intubation (Parnass et al).[18]

All the patients were preoxygenated with 100% O2 for 3 minute. One of the three i/v study drugs preparation (Normal saline, Esmolol 1.5mg/kg and Lignocaine 1.5mg/kg) administered I/V 2 minute before laryngoscopy and intubation. The basis for choosing 2 minutes prior to intubation was based on study on Miller CD et al[6], Yuan L et al[19], Lee TY et al[20] administered drug lignocaine and Esmolol 3 minute before intubation. Kobayashi TL et al[21], used the 4th drug 10% lignocaine spray directly to laryngotracheal just before intubation. Robert K. Stoelting M D. used 4% lidocaine spray just before ET in larynx/trachea.[22]

Succinylcholine is the obvious choice because it provides profound muscular relaxation and ideal conditions for intubation. The dose of Sch has also various from 1-1.5 mg/kg BW. Robert stoelting[8], used 2 mg/kg Laryngoscopy was done with the help of macintosh laryngoscope in this study. Other workers have also employed Macintosh laryngoscope. Patients were intubated with cuffed endotracheal tube and anaesthesia was maintained on gas (N_2O: O_2) (60:40); halothane (0.5%) and a non depolarizing muslerelaxant. The present study was conducted to observe the various haemodynamic response dusing laryngoscopy and intubation. Haemodynamic parameter recorded in the operation theater after a resting level of 10 minute which served as a baseline for further comparison of SBP, DBP and pulse rate which were recorded at different interval i.e. from one minute to 5 minute after intubations. Monitoring of blood pressure and PR was done by pulse oxymeter. To minimize the individual error only one person was asked to record a particular parameter.

The resting blood pressure in the present work was almost same in all the groups since all the patients were healthy individuals. The mean SBP was 124.47 mm Hg, 121.73 mm Hg, 121. 8mmHg and 117.2 mm Hg in group I, II, III and IV respectively. Similarly DBP was 79.20 mm Hg, 78.37 mm Hg, 78.20 mmHg and 77.40 mm Hg in group I, II, III and IV respectively. The pulse rate also had a very marginal difference in means values in Four groups.

The drug used in this study to attenuation in heamodynamic parameters and observed at different time periods as mentioned earlier. The dose of lignocaine instilled I/V was 1.5 mg and Esmolol 1.5 mg I/V and 10% lignocaine spray 1.5 mg/kg. Similar study by Hamill JF et al[10], Laurito CE et al[13] used intravenous lidocaine repeatedly in terms of attenuating the rise in HR and BP as well as its ability to blunt ICP increases. The results from these studies are quite varied, because of different dosage levels (0.5, 1.0, 1.5, or 2.0 mg/kg), 10-13 methods of administration (laryngotracheal, intravenous, or aerosolized), and pre-load times (1, 2, 3, or 5 minutes pre-intubation). Parnass et al[18], found that

a single bolus dose of 100 or 200 mg was able to attenuate the hypertensive and tachycardic responses to laryngoscopy and intubation.[18]

At the period of 1 minute after intubation the rise in PR, SBP & DBP was seen in all the groups. The mean change in PR were 37.60 (±10.86) in group I, 40.90±(9.22) in group II, 37.80 (±10.08) in group III and 8.93(±5.25) in group IV. And Group IV Showed a considerably significant lower evaluation compared to all other groups (P<0.0001). and the intergroups comparison of group I, II, and III were not significant (P>0.05). The level of significance of the group IV with rest of the their group was very high (P<0.0001). Therefore only Esmolol was effectively reduce PR in comparison to all other groups.

The average variation in SBP were 47.23±15.08, 34.13±13.66, 42.40 ±10.14 and 23.60 ± 16.04 in group I, II, III and IV respectively. The group IV showed a considerably significant lower variation compared to all other groups and the level of significance of this group with rest of other were very high (p < 0.0001). The next lower variation were observed in group II and this was also significant lower with group I and group III, but this was significantly higher with group IV. This shows that the group IV gives more accurate result. i.e statistically significant from all other groups. Similarly this result also seen in DBP with mean of average were 40.20 ± 8.01, 34.20 ± 10.31, 36.97 ± 8.88 and 16.60 ± 12.33 in group I, II, III and IV respectively.

Yuan L et al,[19] compare with 100 or 200 mg of bolus esmolol, administered intravenously 2 minute before intubation, found that of esmolol could effectively attenuate the tachycardia and hypertension produced by laryngoscopy and tracheal intubation. Furthermore, esmolol 200 mg presented a better hemodynamic stability than esmolol 100 mg during induction of anesthesia.

Lee TY, et al[20] Studied in 4 groups with each group receiving a designated drug: group A received normal saline as control, while group B, group C and group D received lidocaine 2 mg/kg, fentanyl 3 micrograms/kg and esmolol 2 mg/kg, respectively. Heart rate (HR) and systolic arterial blood pressure (SBP) were obtained every min for 10 min after induction. the incidence of tachycardia (HR > 100/min) was found in 3 of 20 (15%) patients in esmolol group, significantly lower than 17 of 20 (85%) patients in the control group and 15 of 20 (75%) patients in lidocaine group respectively. The incidence of hypertension (SBP > 180 mmHg) was found in 4 of 20 (20%) patients in esmolol group, significantly lower than 16 of 20 (80%) patients in control group and 14 of 20 (70%) patients in lidocaine group, respectively (p < 0.05). Hypertension in lidocaine group (70%) was not significant lower than control groups (80%; p>0.05). It was concluded that this study showed that only esmolol could reliably offer protection against the increase in both HR and SBP, and 2 mg/kg lidocaine had no effect to blunt adverse hemodynamic responses during laryngoscopy and tracheal intubation.

E. Figueredo, E.M. Garcia-Fuentes[22] compare of esmolol with placebo on the haemodynamic changes due to induced by laryngoscopy and tracheal intubation. It was concluded that Esmolol is effective, in a dose-dependent manner, in the attenuation of the adrenergic response.

While the contraductory result found by Splinter WM.[11]; Kobayashi LT et al.[21] Samaha T et al.[23]; Lin PL et al.[24] used i/v lignocaine 1.5mg/kg and found that lignocaine did not attenuate the increase in arterial BP.

At the period of 3 min after ET, Group IV showed a considerably highly significant lower variation compared to all the other group (P<0.0001) and the intergroup compassion between II and III (P>0.05), I and II (P>0.05) I and III (P>0.05) was not significant. The average valuation in SBP were 36.47 (±15.23), 25.04 (±9.68), 32.02 (±14.21) and 12.10 (±9.02) in group I, II, II and IV respectively. Again group IV showed a considerably significant lower variation compared to all other group (P<0.0001) and intergroup comparison between I and III in not significant (P>0.05). and the group II was significant with group I and III that means both esmolol and IV lignocaine decrease SBP but the esmolol in better than lignocaine I/V being of its highly significance similarly this result also seen in DBP with mean of average were 29.87 (±8.48); 23.44 (±10.72), 29.02 (±11.2) and 10.27 (±9.97) in group I, II, III and IV respectively. Esmolol effectively decrease DBP better that all other group.

At 5 minutes, comparison between group I and II, group I and III, II and III were not significant (p>0.05) and group IV showed significant to all the other group (p<0.0001). The averages mean of SBP, DBP were shown in table in respected group. The P value by t- test between group I and III was not significant (p>0.05). and in group I and II, group I and IV was significant (p<0.001). this P value was seen in both SBP and DBP, therefore esmolol and lignocaine intravenous both are effectively in reducing the both SBP and DBP but the esmolol in much better than that of i/v lignocaineat 5 minutes.

Reid and Brace[1] concluded that origin of the reflex which leads to the cardiovascular changes be in trachea, larynx, bronchi and was of vagal type, Burstein (1950) described these changes to be due to an increase in cardiac sympathetic tone rather than vagal tone.

Scott DB et al.[25] were measured the Plasma concentrations of lignocaine in three groups of anaesthetized patients following spraying of the trachea and larynx with a lignocaine 10% aerosol spray. Greater venous plasma concentrations occurred in patients who

were paralysed with suxamethonium. A mean plasma concentration of 0.1 mug/ml of lignocaine resulted from each 10 mg of lignocaine used in spontaneously breathing patients, and 0.15 mug/ml in paralysed patients. In individual patients a concentration 50% in excess of the mean value may occur. The use of lignocaine 100 mg as a 10% aerosol spray can be considered safe. Therefore we used safe dose in our study (10% lignocaine spray 1.5mg/kg) Kautto UM, et al.[26] found similar result with our study that, topical anaesthesia methods are relatively ineffective in preventing haemodynamic changes.

Yusa T, et al.[27], evaluate the effect of intratracheal lidocaine spray (0.5, 1.0, 2.0 mg.kg-1) on blood pressure and heart rate changes to endotracheal intubation were recorded for 10 min every 30 sec. In the control group, mean arterial blood pressure increased significantly compared with the pre-anesthetic values for one min, and with all spray groups at one min after intubation. Heart rate increased significantly at 30 sec after intubation only in the control group. Since the plasma lidocaine concentrations at intubation were below 1.5 micrograms. ml-1, we conclude that intratracheal lidocaine spray depresses the circulatory response to intubation by its local surface analgesic effect.

White PF et al.[28] compare the safety and efficacy of lidocaine 1.5 mg/kg and esmolol 1.4mg/kg. Recorded PR, MAP every min. for 20 min after ET,found that following laryngoscopy and intubation, MAP increased significantly in all treatment groups (control 49% +/- 19%, lidocaine 55% +/- 26%, esmolol 25% +/- 11%,) compared with preinduction baselinevalues. In the esmolol-pretreated patients, the increase in HR was significantly lower (20% +/- 3%) compared with the lidocaine (52%+/- 8%), and control (29% +/- 4%) groups. Concluded that Lidocaine 1.5 mg/kg i.v. were ineffective in controlling the acute hemodynamic response following laryngoscopy and intubation. Esmolol 1.4 mg/kg i.v. was significantly more effective than lidocaine in controlling the HR response to laryngoscopy and intubation ($p < 0.05$) and MAP .Similarly this result found in our study also.

S. Sharma, et al.[29], got similar result by compare the ability of different bolus doses of esmolol to blunt the haemodynamic effects of laryngoscopy and tracheal intubation in treated hypertensive patients. Esmolol 100 mg given as bolus, is effective as well as safe in blunting the haemodynamic responses to laryngoscopy and tracheal intubation in treated hypertensive patient.

Similar result were found by Bensky KP, et al.[30] studied esmolol and its effects on heart rate and blood pressure. This study shows that small doses of esmolol may block the increases in heart rate and blood pressure resulting from laryngoscopy and intubation.

Wang YQ. et al.[31] observe the effects of different doses of esmolol on cardiovascular responses to tracheal extubation. It concluded that Esmolol of 1.5 mg/kg may not only control cardiovascular responses more effectively to the tracheal extubation, but also has no side-effects.

Intravenous lidocaine had been studied repeatedly in terms of attenuating the rise in HR and BP as well as its ability to blunt ICP increases. The results from these studies are quite varied, because of different dosage levels (0.5, 1.0, 1.5, or 2.0 mg/kg), 10-13 methods of administration (laryngotracheal, intravenous, or aerosolized), by Hamill JF et, Laurito CE et al and pre-load times (1, 2, 3, or 5 minutes pre-intubation), Splinter and Cervenko et al.[11] demonstrated that 1.5 mg/kg of intravenous lidocaine could attenuate the increase in MAP and rate-pressure product, but not SBP, DBP, or HR. Yaqub-M Nadi et al[5] compared 1.5 mg/kg of intravenous lidocaine with placebo in 30 patients and found that the mean increase in SBP was 10.3% for patients pretreated with lidocaine and 56% for patients receiving placebo; the mean increase in HR was 16.8% for patient pre-treated with lidocaine and 38.8% for patients receiving placebo. They were concluded that lidocaine offered some protection to hypertension and tachycardia associated with laryngoscopy and intubation. Other studies have questioned the efficacy of lidocaine to attenuate hemodynamic changes secondary to laryngotracheal stimulation by Splinter WM.[11]; Miller CD[6]; Laurito CE[13]; Pathak D.[14]

Esmolol, a water-soluble, cardioselective, and ultra-short-acting ß-adrenergic antagonist, has also been shown to be effective in controlling both the HR and BP responses to intubation, but only in patients undergoing elective surgery studied by Helfman SM[15]; Kindler CH et al[16]; Kampine JP et al[17]; Parnass SM et al[18]; Ebert JP et al found in patients undergoing general anesthesia for elective surgery, that esmolol (loading dose of 500 µg/kg/min for 4 minutes, followed by a maintenance infusion of 300 µg/kg/min for 11 minutes) significantly attenuated the maximum increases in HR and BP when compared with placebo. Another study found that a single bolus dose of 100 or 200 mg was able to attenuate the hypertensive and tachycardic responses to laryngoscopy and intubation (Parnass et al).[18]

The complication studied in our study included the sore throat and sinus tachycardia. In group I II, and III majority of patients showed sinus tachycardia and in group III, patients showed sore throat Tachycardia and hypertension during laryngoscopy and endotracheal intubation is an established phenomenon. There are numerous works who have confirmed this observation and mechanism of the response has been described. These haemodynamic responses usually do not have deleterious effects in normotensive patients. Such responses are definitely hazardous in hypertensive patients where even slight to moderate rises in

haemodynamic parameters may cause serious disturbances or even life threatening complications. This has been of great concern to the anaesthesiologists and in an endeavour to abolish or modify this haemodynamic responses, various methods and drugs have been used. The numerous drugs used itself indicates that none is entirely effective and satifactory.

Recently, anesthesia research has begun to compare the efficacies of several drugs against each other, rather than relying on studies that isolate a single drug's effectvs a placebo intervention. The ability of esmolol vs lidocaine to attenuate the hemodynamic response to intubation was first studied by Helfman et al. in 1990. In the present study compared the efficacy of i/v esmolol, i/v lignocaine and lignocaine 10% spray to determine which best prevented tachycardia and hypertension due to tracheal intubation. The result obtained from our study with this drug found that both i/v esmolol and i/v lignocaine an effective in controlling both SBP and DBP but not by the lignocaine 10% spray. Esmolol were more effective than i/v lignocaine in attenuating the both SBP and DBP. while in PR only esmolol was found effectively significant and rest other not significant. However, esmolol, at an intravenous bolus dose of 1.5mg/kg, "provided consistent and reliable protection against increases in both HR and BP accompanying laryngoscopy and intubation."

Our observations are also in close agreement with those to other workers who used this drug to achieve attenuation.

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