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RESEARCH ARTICLE
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COMPARISON OF LABETALOL VERSUS LIDOCAINE IN ATTENUATION OF HEMODYNAMIC RESPONSE DURING LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION

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ABSTRACT

Objective: To compare labetalol versus lidocaine in attenuation of hemodynamic response during laryngoscopy and endotracheal intubation.

Background: Endotracheal intubation and laryngoscopy are unpleasant stimuli that cause sympathomimetic reactions. Even though it's widely tolerated in healthy individuals, there could be potentially fatal consequences. Although lignocaine and benetacol reduce these reactions, they are linked to hypotension and bradycardia adverse effects.

Study design: A Randomized controlled trial

Place and Duration: This study was conducted in Liaquat University of Medical and Health Sciences Jamshoro from March 2023 to March 2024

Methodology: All patients aged 20-60 years of either gender scheduled for various general surgical procedures under endotracheal anesthesia having ASA status I & II were consecutively enrolled. Two groups LG (lignocaine group) and LB (Labetalol group) was made. Hemodynamic responses in terms of systolic blood pressure (SBP) and mean arterial pressure (MAP) was noted during laryngoscopy and 10 mins after endotracheal intubation.

Results: Out of 62 patients, Mean SBP after laryngoscopy was significantly higher among patients who were in Lignocaine group than in Labetalol group, i.e., 127.48 ±2.54 vs. 122.13 ±2.67 (p-value <0.001, 95% CI 4.03-6.68). Mean MAP after laryngoscopy was significantly higher among patients

who were in Lignocaine group than in Labetalol group, i.e., 104.74 ±3.51 vs. 92.29 ±4.42 (p-value <0.001, 95% CI 10.42-14.48).
Conclusion: A significant difference in attenuation of hemodynamic response was observed in between labetalol versus lidocaine use during laryngoscopy and endotracheal intubation.

Keywords: Hemodynamic Response, Labetalol, Lidocaine, Laryngoscopy, Endotracheal intubation

INTRODUCTION

The gold standard for treating airway obstructions is still rigid laryngoscopy with tracheal intubation. Sympthoadrenal discharge brought on by epipharyngeal and Para pharyngeal stimulations causes hemodynamic alterations, which are characterized by tachycardia, hypertension, and a rise in serum catecholamines [1]. This is a brief response that appears 30 seconds after intubation and goes away in less than ten minutes. [2]. These hemodynamic stress responses in individuals with hypertension, coronary artery disease, cerebrovascular disease, myocardial infarction, and thyrotoxicosis can result in potentially fatal conditions like left ventricular failure, myocardial ischemia, cerebral hemorrhage, and ruptured cerebral aneurysm. [3-4].

Prior to tracheal intubation, several medications such as lidocaine, opioids, α-and β-adrenergic blockers, vasodilator medicines that decrease the sympathoadrenal response, and others can be given to prevent hemodynamic reactions. [5].

It has been demonstrated that labetalol is useful in lowering preoperative cardiovascular events and the reaction to laryngoscopy and intubation [6]. Results from intravenous (IV) lignocaine have been satisfactory. It seems that IV local lignocaine functions by raising the threshold for airway stimulation and centrally blocking sympathetic transmission. However, patients may experience bradycardia, hypoxia, and hypotension with higher lignocaine dosages. [7].

There are many comparable international studies available, but there isn't much local literature. As a result, the current investigation is intended to corroborate the findings of global investigations.

Current study is conducted to compare labetalol versus lidocaine in attenuation of hemodynamic response during laryngoscopy and endotracheal intubation

METHODOLOGY

The study included all patients with ASA status I & II who were scheduled for endotracheal anesthesia for various general surgical procedures and who were between the ages of 20 and 60 years. However, those who were obese, had high blood pressure, were expecting a difficult intubation, or were nursing or pregnant women were not allowed to participate in the trial. Those cases where duration of laryngoscopy and endotracheal intubation was more than 20 seconds was excluded and was replaced by new cases

Data Collection procedure

After approval from the ethical review committee of the institute, the data were collected on pre-designed proforma including age, gender, smoking status, BMI and diabetes mellitus. The BMI was calculated by dividing the weight in kg with height in m^2. Two groups LG (lignocaine group) and LB (Labetalol group) was made by sealed opaque envelop method. Before the treatment, every patient was given nothing to eat for at least eight hours. The night before surgery, a 150 mg ranitidine tablet and a 1 mg lorazepam tablet were administered. Before going into the operating room, all patients received the same intramuscular dose of Glycopyrrolate (0.2 mg). The standard procedures for managing anesthesia were adhered to.

An intravenous injection of lignocaine HCl (1 mg/kg body weight) diluted to 10 ml with 0.9% saline was administered to the LG group five minutes prior to intubation, lasting sixty seconds. Five minutes before to intubation, the LB group received an IV injection of labetalol HCl (0.25 mg/kg body weight) diluted to 10 ml with 0.9% saline. SBP and mean arterial pressure showed hemodynamic reactions during laryngoscopy and 10 minutes following endotracheal intubation..

Data Analysis Plan

SPSS version 22 was utilized for the analysis of the data. The Shapiro-Wilk test was used to determine whether the data were normal. Based on this normalcy, the mean, standard deviation, or median (IQR) was derived for the numerical data, which included age, height, weight, BMI, and hemodynamic responses like SBP and MAP during laryngoscopy and after endotracheal intubation. Mean SBP and MAP were compared using the independent t-test/Mann-Whitney U test. Using the Mann-Whitney U test and post-stratification independent t test, a P-value of < 0.05 was deemed statistically significant.

RESULTS

Out of total 62 patients, the mean age of the patients was 43.06 ±7.74 years. The mean height, weight, and BMI of the patients were 1.56 ±0.07 m, 60.41 ±5.31 kg, and 27.95 ±4.18 kg/m^2 respectively. The mean SBP of the patient during laryngoscopy was 131.04 ±5.96 mmHg while mean SBP after laryngoscopy was 124.81 ±3.74 mmHg.

The mean MAP of the patient during laryngoscopy was 107.63 ±7.40 mmHg while mean MAP after laryngoscopy was 98.52 ±7.42 mmHg. (As shown in Table I)

Table I Descriptive statistics in the study (n=62)

Variable	**Min**	**Max**	**Mean ±SD**
Age (Years)	28	59	43.06 ±7.74
height	1.5	1.63	1.56 ±0.07
Weight (Kg)	54	66	60.41 ±5.31
BMI	23	33	27.95 ±4.18
SBP during laryngoscopy	119	144	131.04 ±5.96
SBP after laryngoscopy	115	132	124.81 ±3.74
MAP during laryngoscopy	93	121	107.63 ±7.40
MAP after laryngoscopy	84	115	98.52 ±7.42

The mean SBP after laryngoscopy was significantly higher among patients who were in Lignocaine group as compared to those who were in Labetalol group, i.e., 127.48 ±2.54 vs. 122.13 ±2.67 (p-value <0.001, 95% CI 4.03-6.68). (As shown in Table II)

Table II : Mean difference of SBP and MAP after laryngoscopy (n=62)

Group		**Mean ±SD**	**p-value (95% CI)**
SBP	Lignocaine	127.48 ±2.54	<0.001 (4.03-6.68)
	Labetalol	122.13 ±2.67	
MAP	Lignocaine	104.74 ±3.51	<0.001 (10.42-14.48)
	Labetalol	92.29 ±4.42	

The mean MAP after laryngoscopy was significantly higher among patients who were in Lignocaine group as compared to those who were in Labetalol group, i.e., 104.74 ±3.51 vs. 92.29 ±4.42 (p-value <0.001, 95% CI 10.42-14.48

Stratification was done to see the effect of baseline characteristics on the outcome. Results are shown in detailed in tables III
and IV

Table III: Association of different variables with differences in SBP after laryngoscopy with r (n=62)

Variables		Group	SBP after Laryngoscopy, mmHg	p-value (95% CI)
			Mean ±SD	
Age, years	≤40 years	Lignocaine	127.60 ±0.58	<0.001 (3.43 to 6.64)
		Labetalol	122.56 ±1.99	
	>40 years	Lignocaine	127.27 ±2.53	<0.001 (3.17 to 8.04)
		Labetalol	121.67 ±3.24	
Gender	Male	Lignocaine	127.53 ±2.53	<0.001 (3.61 to 7.99)
		Labetalol	121.72 ±2.87	
	Female	Lignocaine	127.44 ±2.63	<0.001 (3.30 to 6.86)
		Labetalol	122.35 ±2.60	
BMI	≤30 kg/m^2	Lignocaine	127.53 ±2.55	<0.001 (3.33 to 6.66)
		Labetalol	122.53 ±1.96	
	>30 kg/m^2	Lignocaine	127.42 ±2.62	<0.001 (3.46 to 7.89)
		Labetalol	121.75 ±3.21	
Diabetes Mellitus	Yes	Lignocaine	127.77 ±2.68	0.001 (2.83 to 8.89)
		Labetalol	121.92 ±3.65	
	No	Lignocaine	127.36 ±2.54	<0.001 (3.66 to 6.53)
		Labetalol	122.26 ±1.91	
Smoking	Smoker	Lignocaine	127.71 ±2.87	0.003 (2.64 to 9.92)
		Labetalol	121.43 ±3.35	
	Non-Smoker	Lignocaine	127.42 ±2.51	<0.001 (3.63 to 6.53)
		Labetalol	122.33 ±2.48	
ASA Classification	I	Lignocaine	128.09 ±2.31	<0.001 (4.41 to 7.65)
		Labetalol	122.06 ±2.59	
	II	Lignocaine	126.01 ±2.59	0.003 (1.39 to 6.20)
		Labetalol	122.20 ±2.83	

Table IV: Association of Variables with difference in MAP after laryngoscopy (n=62)

Variables		Group	MAP after Laryngoscopy, mmHg	p-value (95% CI)
			Mean ±SD	
Age, years	≤40 years	Lignocaine	105.10 ±3.86	<0.001 (11.44 to 17.25)
		Labetalol	90.75 ±4.72	
	>40 years	Lignocaine	104.09 ±2.81	<0.001 (7.49 to 12.82)
		Labetalol	93.93 ±3.53	
Gender	Male	Lignocaine	104.01 ±4.05	<0.001 (8.02 to 14.33)
		Labetalol	92.81 ±3.54	
	Female	Lignocaine	105.43 ±2.87	<0.001 (10.62 to 16.25)
		Labetalol	92.01 ±4.89	
BMI	≤30 kg/m^2	Lignocaine	103.94 ±4.02	<0.001 (9.61 to 15.87)
		Labetalol	91.20 ±4.66	
	>30 kg/m^2	Lignocaine	105.71 ±2.58	<0.001 (9.81 to 14.99)
		Labetalol	93.31 ±4.06	
Diabetes Mellitus	Yes	Lignocaine	105.33 ±4.97	

		Labetalol	92.75 ±4.75	<0.001 (8.11 to 17.06)
	No	Lignocaine	104.50 ±2.82	<0.001 (10.23 to 14.77)
		Labetalol	92.01 ±4.31	
Smoking Status	Smoker	Lignocaine	105.71 ±5.56	<0.001 (8.19 to 19.53)
		Labetalol	91.85 ±4.06	
	Non-Smoker	Lignocaine	104.45 ±2.76	<0.001 (9.83 to 14.24)
		Labetalol	92.42 ±4.59	
ASA Classification	I	Lignocaine	105.04 ±3.87	<0.001 (10.66 to 16.43)
		Labetalol	91.50 ±4.89	
	II	Lignocaine	104.01 ±2.45	<0.001 (7.89 to 13.84)
		Labetalol	93.13 ±3.83	

DISCUSSION

According to the current study findings, the mean SBP after laryngoscopy was significantly higher among patients who were in Lignocaine group than in Labetalol group, i.e., 127.48 ±2.54 vs. 122.13 ±2.67 (p-value <0.001, 95% CI 4.03-6.68). Furthermore, the mean MAP after laryngoscopy was significantly higher among patients who were in Lignocaine group than in Labetalol group, i.e., 104.74 ±3.51 vs. 92.29 ±4.42 (p-value <0.001, 95% CI 10.42-14.48).

One study found that while the lignocaine group could not entirely stop the increase in heart rate, they were able to slow it down. In contrast, the labetalol group experienced an initial increase in heart rate, but it eventually decreased after 15 minutes of intubation [8]. Another study by Ramakrishna et al. used intravenous labetalol at 0.75 mg/kg and 1 mg/kg and discovered that there was no increase in mean blood pressure, heart rate, diastolic or systolic after laryngoscopy and intubation. They discovered that lowering the presser response during endotracheal intubation can be achieved simply and effectively with intravenous labetalol. Leslie et al. discovered that there was a dosage-dependent reduction of heart rate after intubation. [9].

Systolic blood pressure was reduced more in the labetalol group, consistent with a research in which the change in mean SBP was most successfully attenuated by labetalol, followed by esmolol, with lignocaine having the least attenuation effect among the three study medicines [10].

Another study findings showed that heart rate was 103.4±8.73 and 111.6±9.40 beats per min in LB and LG groups during laryngoscopy respectively. Mean arterial pressure during laryngoscopy in LB versus LG was 100.68±7.95 and 109.186±10.21 respectively. MAP after intubation was 95.76±9.33 and 103.833±10.31 among LB and LG groups respectively [10].

The Labetalol group had lower values ($P<0.05$) than the lignocaine group. The arterial pressures in the Labetalol group reached basal levels, while the heart rate approached basal levels. The arterial pressures in the Lignocaine group were somewhat higher than basal values, and the heart rate was greater than the baseline value. [11]. Labetalol showed a better attenuation of pulse rate than Lignocaine, ($p< 0.05$). Labetalol group had less alteration in systolic, diastolic and mean arterial blood pressure and showed better attenuation of pressor response ($p< 0.05$)[12].

CONCLUSION

The present study observed that there was a significant difference in attenuation of hemodynamic response in between labetalol versus lidocaine use during laryngoscopy and endotracheal intubation.

LIMITATIONS

The findings of the current study could be highlighted in the light of limitation that this was a single center study and was conducted on a limited number of samples. Further large scale multicenter studies are recommended to preclude the findings of the study.

Ethical Approval
It was taken
Funding Source
None
Conflict of interest
No conflict of interest

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