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The Outcome of Lignocaine HCL, and Labetalol HCL in Low Doses for Attenuation of Hemodynamic Response to Laryngoscopy and Intubation

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Abstract **Original Research Article**

Background: Recently lower dosages of lignocaine and labetalol have been proven to be beneficial in reducing perioperative adverse cardiovascular events. ***Objective:*** In this study our main goal is to evaluate the outcome of lignocaine HCL, and labetalol HCL in low doses for attenuation of hemodynamic response to laryngoscopy and intubation. ***Method:*** This prospective study was done at tertiary hospital from January 2020 to December 2021. In this study 100 consenting patients of age group 31–60 years of either sex and various general surgical procedures under endotracheal anesthesia were included in this study. During the study, 100 patients were randomly divided into two groups depending on the study drug to be given: Group LB: Injection labetalol HCL 0.25 mg/kg body weight diluted to 10 ml with 0.9% saline was given IV 5 min before intubation over 60 s, n=50 and Group LG: Injection lignocaine HCL 1 mg/kg body weight diluted to 10 ml with 0.9% saline was given IV 5 min before intubation over 60 s, n=50. ***Results:*** during the study, majority were belonged to 41-50 years age group and 60% were male. The increase in mean HR was observed in LG groups but least in labetalol group. Besides that, increase in SBP in group lignocaine but not in labetalol group whereas DBP increased in all both groups almost similarly. RPP in peri-intubation period was most stable in group LB whereas mean atrial pressure increase in group LG was higher than that in group LB. ***Conclusion:*** Labetalol was found to be superior for the reduction of HR, SBP, DBP, mean arterial pressure, and RPP during and after laryngoscopy and endotracheal intubation in both intra- and inter-group comparisons.

Keywords: laryngoscopy, hemodynamic response, labetalol.

INTRODUCTION

Direct laryngoscopy and endotracheal intubation typically result in a cardiovascular stress response seen as hypertension, tachycardia, and a rise in blood catecholamine levels. These reex hemodynamic alterations are easier tolerated in healthy people, but they are substantially amplified and harmful in comorbid individuals [1-4]. These hemodynamic stress reactions in vulnerable individuals can result in life-threatening diseases such as left ventricular failure, myocardial ischemia, cerebral hemorrhage, and burst cerebral aneurysms, among others.

In this case, the use of intravenous (IV) lignocaine has yielded good results. The mechanism of IV local anesthetics appears to be caused by a higher threshold for airway stimulation and central suppression of sympathetic transmission. Increasing the dosage of lignocaine may cause hypotension, bradycardia, and hypoxia. Whereas, labetalol, and a blocker, has also been proven to be beneficial in reducing perioperative adverse cardiovascular events, but greater dosages may produce hypotension and bradycardia [5, 6]. The argument for continuing the search for an optimum anesthetic approach that is both effective and safe in order to reduce adverse cardiovascular effects may be found here. Numerous attempts have been attempted to obstruct these unfavorable reexes via the usage of various measures and medications [7].

In this study our main goal is to evaluate the outcome of lignocaine HCL, and labetalol HCL in low doses for attenuation of hemodynamic response to laryngoscopy and intubation.

OBJECTIVE

To evaluate the efficacy of lignocaine HCL, and labetalol HCL in low doses for attenuation of hemodynamic response to laryngoscopy and intubation.

METHODOLOGY

This prospective study was done at tertiary hospital January 2020 to December 2021. In this study 100 consenting patients of age group 31–60 years of either sex or various general surgical procedures under endotracheal anesthesia were included in this study. During the study, 100 patients were randomly divided into two groups depending on the study drug to be given: Group LB: Injection labetalol HCL 0.25 mg/kg body weight diluted to 10 ml with 0.9% saline was given IV 5min before intubation over 60 s, n=50 and Group LG: Injection lignocaine HCL 1 mg/kg body weight diluted to 10 ml with 0.9% saline was given IV 5 min before intubation over 60 s, n=50.

RESULTS

In Table 1 shows age distribution where majority were belong to 41-50 years age group, 40% followed by 30% belong to 31-40 years age group, 20% belong to >51 years. The following table is given below in detail:

Table 1: Age distribution

Age group	Percent
31-40 years	30
41-50 years	40
>51 years	20
Total	**100.0**

In figure 1 shows gender distribution of the patients where majority were male, 60%. The following figure is given below in detail:

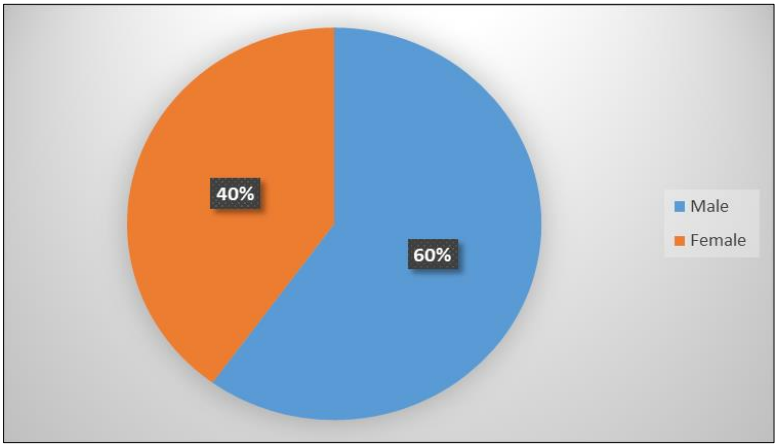

Figure 1: Gender distribution of the patients

In Table 2 shows distribution of the patients according to heart rate where the increase in mean HR was observed in LG groups but least in labetalol group. The following table is given below in detail:

Table 2: Distribution of the patients according to heart rate

Heart rate	Group LB	Group LG	Group LB versus Group LG
BV	98.52±8.53	98.84±11.95	0.90
DL	103.4±8.73	111.6±9.40	0.00
AI1	101.08±8.65	111.04±10.74	0.00
AI3	96.68±8.43	108.4±10.70	0.00
AI5	97.4±6.91	105.6±11.06	0.00
AI7	96.48±7.10	103.16±8.85	0.00
AI10	97.6±6.91	100.24±8.70	0.23

In Table 3 shows Comparison of mean systolic blood and diastolic pressure between groups where increase in SBP in group lignocaine but not in labetalol group whereas DBP increased in all both groups almost similarly. The following table is given below in detail:

Table 3: Comparison of mean systolic blood and diastolic pressure between groups

Systolic Blood pressure	Group LB	Group LG	Group LB versus Group LG
BV	122.76±7.76	122.16±7.06	0.00
DL	127.72±9.41	138.92±12.26	0.00
AI1	123.12±6.10	139.08±10.91	0.00
AI3	121.72±6.52	136.04±11.76	0.00
AI5	120.28±7.71	135±12.23	0.00

AI7	121.08±8.23	134.6±13.19	0.00
AI10	120.08±9.78	133.72±10.86	0.00
Diastolic blood pressure	**Group LB**	**Group LG**	**Group LB versus Group LG**
BV	78.88±2.94	79.6±5.53	0.56
DL	87.16±8.28	94.32±12.13	0.01
AI1	85.16±5.94	91.76±13.09	0.03
AI3	84.32±7.15	89.65±11.75	0.06
AI5	85.04±8.83	89.36±12.29	0.17
AI7	86.00±7.76	88.56±12.87	0.41
AI10	83.6±10.22	87.36±11.65	0.24

In Table 4 shows comparison of mean arterial pressure among between two groups where increase in group LG was higher than that in group LB. The following table is given below in detail:

Table 4: Comparison of mean arterial pressure among between two groups

Arterial pressure	Group LB	Group LG	Group LB versus Group LG
BV	93.507±3.67	93.786±5.27	0.83
DL	100.68±7.95	109.186±10.21	0.00
AI1	97.813±5.57	107.533±11.01	0.00
AI3	96.786±6.37	105.133±10.46	0.00
AI5	96.786±7.74	104.573±11.38	0.00
AI7	97.693±6.96	103.906±12.05	0.04
AI10	95.76±9.33	102.833±10.31	0.01

In Table 5 shows comparison of means rate pressure product (RPP) between two groups where RPP in peri-intubation period was most stable in group LB. The following table is given below in detail:

Table 5: Comparison of means rate pressure product (RPP) between two groups

Means rate pressure product	Group LB	Group LG	Group LB versus Group LG
BV	12,092±259.17	12,103.20±1892.11	0.97
DL	13,204.20±274.88	15,563.36±2493.65	0.00
AI1	12,446.24±218.58	15,456.24±2143.28	0.00
AI3	11,759±268.12	14,748.16±2006.29	0.00
AI5	11,737.28±242.52	14,250.60±2013.00	0.00
AI7	11,685.68±242.52	13,904±1908.01	0.00
AI10	11,756.24±313.86	13,385.92±1439.73	0.00

DISCUSSION

There was only slight and statistically insignificant increase in SBP in labetalol group at 1 min AI. Thereafter up to 10th min of intubation SBP was significantly lower than baseline values. Contrary to labetalol group in other two groups SBP was significantly higher at DL and intubation, and remained higher till 10th min of study period. Hence, comparison of labetalol with lignocaine, labetolol was found to be more efficacious than lignocaine in attenuating the SBP response to laryngoscopy and intubation.

Here labetalol is selective α1 and nonselective β1 and β2 adrenergic receptor blocking agent, it lowers the systemic blood pressure by decreasing systemic vascular resistance (α1 action) and also controls reeks tachycardia triggered by vasodilatation by β blockade. It also has weak β2 agonistic activity therefore may cause vasodilatation. Cardiac output remains unchanged [8-10].

Lignocaine practically has minimal hypotensive and no vasodilating properties [11]. Thus, the change in mean SBP was most effectively attenuated by labetalol, whereas lignocaine showed least attenuation effect among the study drugs.

In our study, the rise in DBP was not significantly attenuated ($P < 0.05$) by lignocaine, whereas labetalol showed statistically significant attenuation at least up to 3 min. The reason might be that our study drugs labetalol, and lignocaine are not very effective in controlling DBP rise. It is stated in the pharmacology of labetalol that "Increase in SBP rise during exercise are reduced by labetalol but corresponding changes in DBP are essentially normal [12].

Labetalol found to be more efficacious than esmolol in attenuating the mean arterial pressure response to laryngoscopy and intubation. However, this effect was not observed at DL and immediately

thereafter. However, grossly the change in mean arterial pressure was most effectively attenuated by labetalol, , while lignocaine showed least attenuation effect among the study drugs.

Our results concurred with the study they found that lignocaine 1.5 mg/kg were not superior to each other in suppression of hemodynamic response to intubation [13].

RPP is an index of myocardial oxygen consumption. It is the product of SBP and HR. Values in excess of 15,000 are considered critical. Increase in RPP due to increase in HR is potentially more deleterious than that due to increase in blood pressure [14].

In our study, in group LB RPP never exceeded critical 15,000 marks. Thus the change in mean RPP was most effectively attenuated by labetalol, whereas lignocaine showed least attenuation effect among the study drugs.

In a recent study on comparison of labatelol with dexmedetomidine, dexmedetomidine better attenuated the sympathomimetic responses to endotracheal intubation. Although labetalol had maintained the stability of the blood pressure, HR response was not attenuated better DL and intubation [15].

CONCLUSION

Labetalol was found to be superior for the reduction of HR, SBP, DBP, mean arterial pressure, and RPP during and after laryngoscopy and endotracheal intubation in both intra- and inter-group comparisons.

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