Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

Original research article

Comparison of heart rate between melatonin and pregabalin groups: Laryngoscopy and intubation in general anaesthesia

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Accepted on: 02/07/2024

Abstract

Laryngoscopy and endotracheal intubation (LETI) are both regarded powerful stressors that cause haemodynamic instability, resulting in a rise in heart rate and blood pressure. A total of 50 patients planned for general anesthesia admitted in various surgical departments were included in the study after a written informed consent. In our study, we observed that HR was lower than baseline in Melatonin group compared to Pregabalin group at all-time points. The highest increase in HR in the Pregabalin group occurred at 0 minutes after intubation and recovered to baseline after 10 minutes. The difference in heart rate between the two groups was statistically significant until 10 minutes after intubation (p-0.05).
Keywords: Heart rate, melatonin, pregabalin

Introduction

When delivering general anaesthesia, airway management and patient safety are the most critical concerns for an anesthesiologist. For maintaining ventilation, preventing aspiration, and delivering anaesthetic gases, endotracheal intubation is the gold standard.

Laryngoscopy and endotracheal intubation (LETI) are both regarded powerful stressors that cause haemodynamic instability, resulting in a rise in heart rate and blood pressure [1]. In healthy persons, this is presumably of no concern. However, individuals with poor myocardial reserve, such as those with cardiac dysrhythmias, coronary artery disease, congestive heart failure, cardiomyopathy, hypertension, and those in the elderly age range, are particularly vulnerable to these occurrences [2]. As a result, it is necessary to take steps to reduce these pressor responses. Somatovisceral reflexes induced by sympathetic stimulation are the mechanisms behind these haemodynamic alterations. The laryngeal and tracheal sensory receptors are triggered during tracheal intubation, producing the release of endogenous catecholamines, which causes tachycardia and hypertension [3].

Various pharmacologic regimens and strategies have been employed to reduce these stress responses since the invention of LETI. Examples being opioids (fentanyl, alfentanil), beta blockers (esmolol, labetalol), benzodiazepines (midazolam, alprazolam), sympatholytics (clonidine, dexmedetomidine and methyldopa), barbiturates, propofol and peripheral vasodilators (sodium nitroprusside, nitroglycerine) [4]. Hypotension, tachycardia, bradycardia, respiratory depression, rebound hypertension, and allergic responses are some of the limitations of the above drugs. Hence, there has always been a need for a better drug to attenuate sympathetic response to laryngoscopy and intubation. The present study is undertaken to determine the effect of melatonin versus pregabalin in attenuating hemodynamic response to LETI.

Methodology

Study design: Observational Analytical Study.

Study Population

A total of 50 patients planned for general anesthesia admitted in various surgical departments were included in the study after a written informed consent.

Inclusion criteria

- Patients between ages 20 - 45yrs undergoing elective surgery.
- ASA class 1 and 2.

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- Both sexes.

Exclusión criteria

- Younger than 20yrs or older than 45 yrs.
- ASA grade 3 and 4.
- Anaemia.
- Patients with compromised renal status, Cardiac disease, hypertension, COPD and asthma, diabetes, psychiatry illness, antiepileptic drugs, sedatives, anxiolytics, allergy to any anaesthetic medication, pregnant and lactating women.
- Anticipated difficulty in intubation (mallampati class 3 and 4) and those requiring more than three attempt or more than 20s for laryngoscopy.

Fifty normotensive patients of status ASA grade 1 and 2 between age 20-45 years old, 40-65kg body weight, undergoing elective surgeries under general anaesthesia were included in the study after ethical clearance.

On the day of operation, the patient was evaluated preoperatively. After taking written and informed consent, indication for surgery, baseline heart rate and blood pressure were noted. Basic appropriate investigations like Hb, complete blood count, serum urea and creatinine, blood sugar, urine examination, chest X-ray and ECG were done.

Patients were advised 6-8 hours fasting prior to surgery and are received tablet ranitidine 150 mg the previous night.

1. Group A (n=25) patients received oral 6 mg melatonin tablets (two tablets of 3 mg each) 120 mins before surgery.
2. Group B (n=25) patients received 150 mg of pregabalin tablet 90 mins before surgery.

Total of 50 patients who received these tablets before surgery were observed and studied.

Patients were taken to the operation theatre, pulse oximeter, noninvasive blood pressure, ECG and end-Tidal CO_2 monitors were connected. Baseline vital parameters - HR, SBP, DBP and MAP were measured before induction.

Results

Table 1: Distribution of gender in 2 groups

			Gender		Total
			F	M	
Group	1	Count	12	13	25
		% within Group	48.0%	52.0%	100.0%
	2	Count	14	11	25
		% within Group	56.0%	44.0%	100.0%
Total		Count	26	24	50
		% within Group	52.0%	48.0%	100.0%

The gender distribution in two groups is shown in Table 1. There were 13 men and 12 women among the 25 patients in the Melatonin group. There were 11 men and 14 women in the Pregabalin group.

According to the Chi-square test, the p-value was 0.571, suggesting that there was no statistical significance of gender between 2 groups.

Table 2: Comparison of heart rate between 2 groups

	Group	N	Mean	Std. Deviation	t	p value
HR_Baseline	1	25	86.16	6.663	8.319	<0.001
	2	25	72.40	4.899		
HR_B_Ind	1	25	62.68	9.569	-5.775	<0.001
	2	25	74.88	4.475		
HR_A_Ind	1	25	63.32	9.362	-5.069	<0.001
	2	25	75.20	7.047		
HR_0 m	1	25	64.28	9.285	-10.157	<0.001
	2	25	89.32	8.107		
HR_3 m	1	25	67.88	8.743	-6.674	<0.001
	2	25	84.16	8.503		
HR_5 m	1	25	69.80	8.421	-5.415	<0.001
	2	25	81.56	6.856		
HR_10 m	1	25	71.36	9.517	-2.980	0.005
	2	25	78.48	7.223		

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

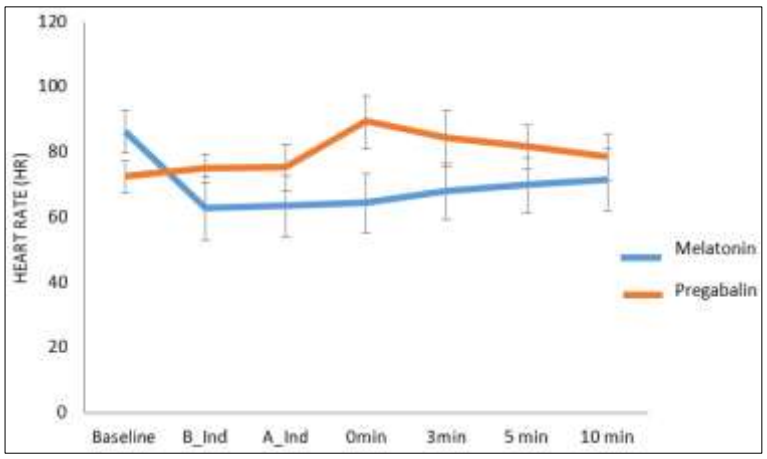

Fig 1: Comparison of HR between 2 groups

Comparison between heart rate at all time show statistically significant difference ($p< 0.05$) between the two study groups as seen in the above table and graph.

Discussion

Pregabalin attains peak plasma concentration approximately 60 mins after administration. Similarly, Melatonin is known to have peak effect at 60 mins after administration and thus both drugs were administered 60 mins and 120 mins before induction of general anesthesia [5].

In our study, we observed that HR was lower than baseline in Melatonin group compared to Pregabalin group at all time points. The highest increase in HR in the Pregabalin group occurred at 0 minutes after intubation and recovered to baseline after 10 minutes. The difference in heart rate between the two groups was statistically significant until 10 minutes after intubation (p-0.05).

The observations of study conducted by Priyamvada Gupta *et al*., to evaluate the role of melatonin in attenuation of haemodynamic responses to laryngoscopy and intubation were also similar to our study [6].

Melatonin reduced the stress response to laryngoscopy and intubation better than clonidine in a comparative research by Choudhary S *et al*., as seen by changes in heart rate and rate pressure product at 0, 1, 3, and 5 minutes post intubation [7].

Thus, data from this study and previous studies show that 6 mg of Melatonin is more effective than 150 mg of Pregabalin in attenuation of hemodynamic responses.

Melatonin's anxiolytic properties may explain why it lowers heart rate. The synergy between melatonergic and GABAergic systems is most likely the underlying mechanism. It also possesses analgesic effects, which have been found by numerous researchers and may contribute to haemodynamic stability [8].

Conclusion

There was significant statistical difference in HR, between Melatonin and Pregabalin groups. Melatonin group showed significant decrease in HR during study period compared to Pregabalin group.

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ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 08, 2024

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