Indian Journal of Clinical Anaesthesia 2020;7(4):575–578

Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Clinical Anaesthesia

Journal homepage: www.ijca.in

Original Research Article

To evaluate the efficacy between 0.15mg/Kg and 0.25mg/Kg of iv labetalol in the suppression of haemodynamic response to extubation

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ARTICLE INFO

Article history:
Received 11-05-2020
Accepted 21-05-2020
Available online 25-11-2020

Keywords:
Labetalol
Haemodynamic response
Extubation

ABSTRACT

Background: Tracheal extubation process evokes stress response which causes autonomic variations such as tachycardia, rise in systolic arterial blood pressure and diastolic arterial blood pressure which is potentially lethal in high risk patients.
Thus this study is conducted to compare the efficacy between 0.15mg/kg and 0.25mg/kg of iv Labetalol in the suppression of haemodynamic response to Extubation.
Materials and Methods: 60 participants aged between 18-55 yrs belonging to ASA 1 or 2 were randomly allocated into 2 groups. Group Lb received injection Labetalol 0.15mg/kg and Group Lt received injection Labetalol 0.25mg/kg. Heart rate, systolic arterial blood pressure and diastolic arterial blood pressure were recorded at basal, two, five, eight minutes after drug infusion, at extubation and one, three, five, eight, ten and fifteen minutes post extubation.
Results: Group Lt showed a better lowering values in heart rate, systolic arterial blood pressure and diastolic arterial blood pressure after drug infusion, at Extubation, and fifteen minutes post Extubation compared to Group Lb.
Conclusion: Injection Labetalol 0.25mg/kg showed a effective suppression of haemodynamic response to Extubation compared to injection Labetalol 0.15mg/kg.

1. Introduction

The surgeries performed with securement of airway with endotracheal tube placement will be followed by extubation at the end of surgical procedure. Extubation may be associated with upper airway obstruction, laryngospasm, bronchospasm, tachycardia, hypertension and dysrhythmias. Thus a smooth extubation is essential to avoid the consequences that arise due to rise in plasma concentration of catechlamines.[1]

Different methods had experimented with aiming for smooth extubation such as extubation in deep planes of anaesthesia and usage of pharmacological modes such as lidocaine, opioids, calcium channel blockers, magnesium sulphate and propofol but none of them were fully efficacious.[2,3] Labetalol is a combined alpha and beta-adrenoceptor antagonist. It is a salicylamide derivative.[4] It is an antihypertensive drug available in oral and parenteral form.Labetalol shows selective antagonist activity over alpha-1 adrenergic receptors and nonselective blockade over beta-1 and beta-2 adrenergic receptors.[5] It shows antagonist activity over alpha and beta receptors in the ratio of alpha: beta = 1:7 for intravenous administration.[6] Thus the present study is undertaken to evaluate the efficacy between 0.15mg/kg and 0.25mg/kg of iv Labetalol in the suppression of haemodynamic response to extubation.

2. Materials and Methods

After obtaining clearance from ethical committee and informed risk consent was taken from all the 60 patients who were belonging to ASA class 1 or 2 and of the age group 18

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https://doi.org/10.18231/j.ijca.2020.104

– 55 yrs.

Name of the group were enclosed in opaque sealed envelopes which were later shuffled based on which the participants were divided into two groups. Patients with cardiac, renal and hepatic impairement, cerebral disease, difficult airway, heart blocks, bradycardia(heart rate <60bpm) were excluded from the study.

Group Lb- injection Labetalol 0.15mg/kg body weight was diluted with normal saline upto 10ml and administered intravenously over a period of 10 minutes using a syringe pump before extubation.

Group Lt - injection Labetalol 0.25mg/kg body weight diluted with normal saline upto 10ml and administered intravenously over a period of 10 minutes using a syringe pump before extubation.

Injection Midazolam 0.05mg/kg body weight and injection ondansetron 0.1mg/kg body weight were given as premedications to all the patients and all patients were induced with 5mg/kg injection thiopentone and 0.1 mg/kg injection vecuronium.

Anaesthesia was maintained with oxygen, nitrous oxide, isoflurane with intermittent dose of injection vecuronium.

0.15mg/kg of injection Labetalol diluted with normal saline upto 10ml administered intravenously over 10 minutes using a syringe pump before extubation for the group Lb and 0.25mg/kg injection Labetalol diluted with normal saline upto 10ml administered intravenously over 10 minutes before extubation for group Lt. At the end of the procedure, Reversal of neuromuscular blockade was done using 0.05mg/kg body weight of inj Neostigmine and 0.01mg/kg body weight of inj glycopyrrolate at the end of the procedure.

Haemodynamic parameters such as heart rate,systolic arterial blood pressure and diastolic arterial blood pressure were recorded at basal, two, five, eight minutes after drug infusion, at the time of extubation and at one, three, five, eight, ten and fifteen minutes postextubation.

2.1. Statistical analysis

After discussion with the statistician and on the basis of pilot study observations, for ensuring a power of study 0.80 and assumption of 5% patients would drop out, the final study sample size was fixed at 30 patients in each group.

3. Results

Demographic variables such as weight, age, sex were comparable.

3.1. Heart rate

Group Lb and group Lt did not show any statistically significant difference with respect to the basal mean heart rate.

The mean heart rate showed a decreased trend in group Lb and group Lt after drug infusion and at one, three, five, eight and fifteen minutes post extubation but the statistically significant fall in mean heart rate was noted in group Lt compared to group Lb.

The mean heart rate was rised by 9bpm(10.4%) at the extubation in group Lb whereas the mean heart rate was rised by 3bpm(4%) at extubation in group Lt compared to basal value which was statistically significant.

The mean heart rate was below the basal value even at fifteen minutes postextubation in group Lb and group Lt.

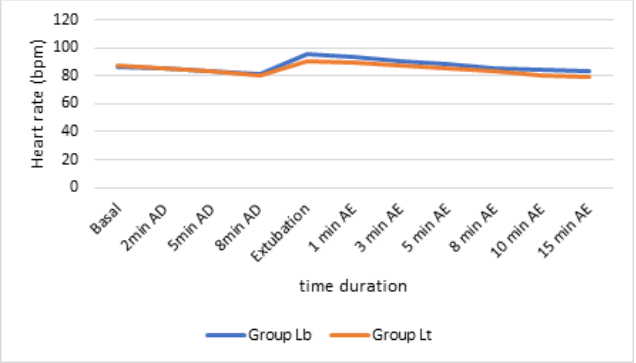

Fig. 1: Showing changes in mean heart rate between group Lb and group Lt. (AD= after drug infusion, AE= after extubation)

3.2. Systolic arterial blood pressure and diastolic arterial blood pressure

There was no statistically significant difference with respect to the basal value of mean systolic arterial blood pressure and mean diastolic arterial blood pressure among the group Lb and group Lt.

The mean systolic arterial pressure and mean diastolic arterial pressure showed a falling trend upon drug infusion and one, three, five, eight and fifteen minutes postextubation in group Lb and group Lt but a statistically significant falling trend was noticed in group Lt compared to group Lb.

The mean systolic arterial blood pressure and mean diastolic arterial blood pressure was lowered by 2mmhg(2%) and 2mmhg(2%) respectively in group Lb at the time of extubation but the mean systolic arterial blood pressure was lowered by 5mmhg(4%) and the mean diastolic arterial blood pressure was lowered by 4mmhg(6%) in group Lt compared to baseline value at the time of extubation which was statistically significant.

The mean systolic arterial blood pressure and mean diastolic arterial blood pressure was below the baseline value even after fifteen minutes postextubation.

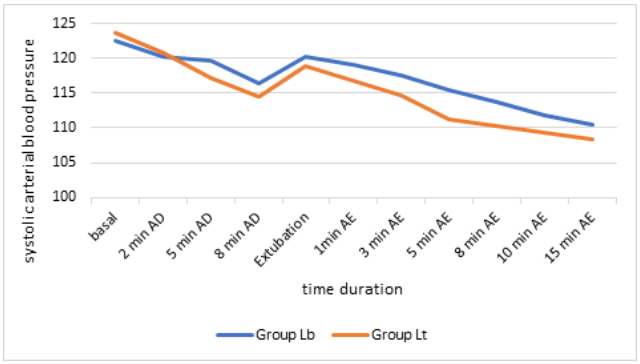

Fig. 2: Showing changes in mean systolic arterial blood pressure between group Lb and group Lt.
(AD= after drug infusion, AE= after extubation)

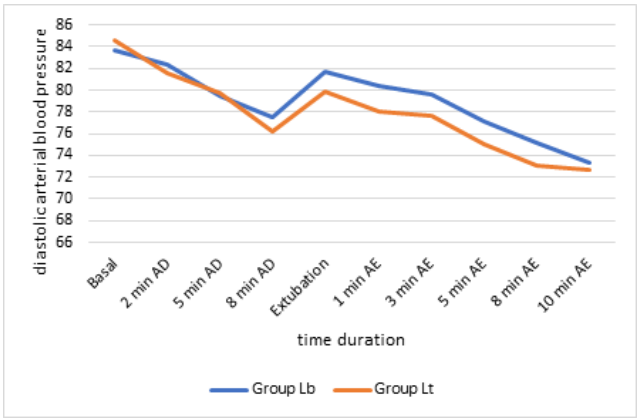

Fig. 3: Showing changes in mean diastolic arterial blood pressure between group Lb and group Lt.
(AD= after drug infusion, AE= after extubation)

4. Discussion

The Extubation process evokes haemodynamic stress response due epipharyngeal and laryngopharyngeal stimulation. The stress response manifests in the form of autonomic disturbances such as hypertension, tachycardia, arrhythmias and also associated with coughing, straining and bronchospasm.[2,7]

Richards et al in 1974 used Labetalol as a combined alpha and beta-adrenoceptor antagonist and used in the medical treatment of hypertension.[4]

Labetalol has two optical centres with four isomers. The R, R isomer is about four times more potent as a β receptor antagonist than racemic Labetalol but it is less than 20% potent as an alpha 1 antagonist compared to racemic mixture.[8]

Labetalol exhibits equilibrium-competitive antagonism at beta and alpha receptors. Labetalol by causing alpha-1 blockade decreases the blood pressure whereas tachycardia will be attenuated by simultaneous beta blockade. This property of Labetalol helps to supress the haemodynamic stress response.[9,10]

Labetalol is a moderately lipid soluble drug with the peak effect on Intravenous administration is 5 -15 minutes.[11]

In the study conducted by Kumar R et al.[12] between 0.15mg/kg and 0.3mg/kg doses of Labetalol on suppression of pressor responses to laryngoscopy and endotracheal intubation, the authors found out that both the doses of Labetalol were efficient in supressing the haemodynamic stress response to laryngoscopy and intubation in a dose dependent manner.

In the study conducted by Younes M M et al.[13] comparing labetalol with fentanyl and lidocaine, Labetalol was better in attenuation of haemodynamic stress response to extubation.

In the studies conducted by Ratnani et al.,[13] Jaiswal A et al.,[14] Anand KJ et al.[15] Labetalol effectively suppressed the sympathoadrenal response to intubation.

The studies are very deficient comparing the various doses of Labetalol which can be used effectively to suppress the pressor response to extubation, which made us to undertake this study.

The onset of action of IV Labetalol starts within 2-5 minutes with peak effect occurs between 5-15 minutes. Hence in our study we administered the study dosages of IV Labetalol diluted to 10ml with normal saline given 10 minutes before extubation using a syringe pump.

On analysis of our study results, at extubation, the rise in the mean heart rate was 9bpm(10.4%), the fall in mean systolic arterial blood pressure and diastolic arterial blood pressure was 2mmhg(2%) and 2mmhg(2%) respectively in 0.15mg/kg of iv Labetalol group whereas the rise in mean heart rate was 3bpm(4%), the fall in mean systolic arterial blood pressure was 5mmhg(4%) and the fall in mean diastolic arterial blood pressure was 4mmhg (6%) compared to baseline value in the group who were administered 0.25mg/kg of iv Labetalol. In both the groups, the mean heart rate, mean systolic arterial blood pressure and diastolic arterial blood pressure remained below the baseline even 15minutes postextubation. Even though both the doses attenuated the haemodynamic response to extubation,the dose of 0.25mg/kg of iv Labetalol was more effective in maintaining stable haemodynamics.

In the study conducted by Kunakeri SB et al.,[16] at 1minute postintubation, it was observed that in L1 group (0.1mg/kg), the mean heart rate was rised by 14bpm, the rise in mean systolic blood pressure was 20mmhg and the rise in mean diastolic blood pressure was 7mmhg compared to baseline value whereas in the group L2(0.2mg/kg), the rise in mean heart rate was 10bpm, the mean rise in systolic blood pressure was 9mmhg, the rise in mean diastolic blood pressure was 5mmhg compared to baseline value. Thus they concluded that both the doses effectively attenuated the haemodynamic response to intubation in a dose dependent manner.

5. Limitation of Our Study

More accurate results will be obtained if invasive blood pressure monitoring is done.

6. Benefits of Our Study

Labetalol in a dose of 0.25mg/kg efficiently attenuate the haemodynamic response thereby prevents the untoward complications due to stress response of extubation.

There were no statistically significant side effects in our study.

7. Conclusion

From our study, it was found that iv Labetalol 0.25mg/kg administered 10 minutes prior to extubation effectively suppressed the haemodynamic response to extubation compared to iv Labetalol 0.15mg/kg.

8. Source of Funding

None.

9. Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper

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Cite this article: Sindhu S, Srinivas VY. To evaluate the efficacy between 0.15mg/Kg and 0.25mg/Kg of iv labetalol in the suppression of haemodynamic response to extubation. *Indian J Clin Anaesth* 2020;7(4):575-578.