ORIGINAL RESEARCH PAPER

Anesthesiology

KEY WORDS: Attenuation, cardiovascular response, Laryngoscopy, Intubation, Fentanyl, Lignocaine

A COMPARISON OF INTRAVENOUS FENTANYL AND INTERVENOUS LIGNOCAINE FOR ATTENUATION OF CARDIO-VASCULAR RESPONSES TO LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION IN ROUTINE ELECTIVE CASES

Dr Chatterjee Tarit Senior Consultant Anaesthesiologist, Peerless Hospital, Kolkata

ABSTRACT

BACKGROUND : The study was carried out to compare the efficacy of Fentanyl and Lignocaine on cardio-vascular responses to endotracheal intubation.

METHOD : Hundred ASA I & II were divided equally into groups A and B. Induction of anaesthesia and intubation was performed with Propofol 2 – 2.2mg per kg and suxamethonium 1.5 mg per kg. Group A received Fentanyl 6 microgram / per kg 5 mins before induction and Group B received Lignocaine 1.5 microgram /per kg, 90 secs before Laryngoscopy. Measurements including heart rate; systolic, diastolic, mean blood pressure were noted in each group before induction and 3 mins after intubation and were tabulated.

RESULTS : After intubation incidents of tachycardia, rise in blood pressure were statistically significantly high in Lignocaine group than in Fentanyl group.

CONCLUSION : Attenuation of cardiovascular response is seen in both groups. Of the two groups Fentanyl is more effective.

INTRODUCTION:

In 1940 Reid and Brace (1) first described hemodynamic response to laryngoscopy and endotracheal intubation. Laryngoscopy and intubation after induction of anesthesia generate pressure and sympathoadrenal response which are thought to be due to somatovisceral reflex caused by stimulation of epipharynx and laryngopharynx (2). It starts within 5s, reaches a peak in 1 to 2 min and return to baseline within 5 minutes. These response results in increased circulatory catecholamines, heart rates, blood pressure, increased myocardial oxygen demand and dysrhythmias. Average increase in HR is 23 beats and increase in BP is 53/54 mmHg and decrease in left ventricular ejection fraction by approximately 20 % (2). These changes may be detrimental in high risk patients and may be associated with myocardial ischemia and cerebral hemorrhage (2).

Various methods of attenuation of response to laryngoscopy and intubation are still in search from the date of its recognition. This techniques include topical anesthesia of oropharynx, laryngotracheal instillation of lignocaine just prior to intubation, intravenous lignocaine, adrenergic blocking drugs (alpha and beta blocker), vasodilators like hydralazime, nitroglycerine, deep inhalational anesthesia, intravenous opioid etc. No single agent has been established as the most appropriate for this purpose.

Among the recommended procedures intravenous lignocaine or fentanyl appears to best fulfill the above mentioned criteria (3).

Aim of this study is to compare lignocaine, fentanyl for the attenuation of the cardio-vascular response to direct laryngoscopy and intubation during general anesthesia (3).

MATERIAL AND METHOD:

After approval from hospital ethical committee this prospective randomized double-blind study was conducted among hundred patients of ASA I and II of either sex in the age group of 20 to 50 years. Written informed consent was taken.Patient wth allergy to any of the study drug, smoker, BMI greater then 30, modified Mallampati class III and IV, cardio-respiratory, renal and hepatic , metabolic, cerebro-vascular disorder and anticipated difficult airway were excluded.

100 patients were randomly allocated into 2 groups of 50 each.
Group A: Received Fentanyl 6 mcg/kg bodyweight
Group B: Received Lignocaine Hydrochloride 2 %, 1.5 mg/kg bodyweight.

All patients fasted for 6-8 hour,received alprazolam 0.5mg night before surgery,glycopyrrolate 0.2mg IV 15 minutes before induction. Standard monitoring including non-invasive blood pressure (systolic, diastolic and mean), heart rates, oxygen saturation (SPO2) and continuous electrocardiography were recorded.

Standard anesthetic technique was used. Group A received Fentanyl 6mg/kg bodyweight 5 minutes before induction and Group B received Lignocaine hydrochloride 1.5mg/kg bodyweight 90 sec before laryngoscopy. Induction was done after pre-oxygenation with propofol 2-2.2 mg/kg until the eyelash reflex disappeared and intubation was facilitated with Suxamethonium 1.5 mg/kg bodyweight. Intermittent positive pressure ventilation was done for 2 min with N2O 66% in O2 with Isoflurane 0.6 % at flow rate of 6 l /min. Subsequently laryngoscopy and intubation was done. Laryngoscopy was limited to 15 sec. Hemodynamic parameters were recorded immediate pre-operatively (baseline value} & 3 mins after intubation. No surgical stimulus was allowed during this period.

The result was obtained in each group (Group A and Group B) before intubation(base line) and 3 mins after intubation were tabulated. Compared with the baseline value changes in the hemodynamic responses were slightly significant at 1 min post intubation and highly significant difference at 3 mins, while at 5th min statistically no significant difference were seen. (3). That is why comparison was done between the baseline value and value at 3 mins post intubation. The values within each group 3 mins after laryngoscopy and intubation were compared with baseline value and were statistically analyzed using paired 't' test . Probability value (P) were seen from the statistical table. P values and their significances are as follows:
P>=0.05 – Not statistically significant
P<0.05 - Statistically significant
P<0.001 – Very highly statistically significant

RESULTS:

Table 1 shows distribution of the Age, Sex and Body Weight between the two groups :

VARIBLES	GROUP A	GROUP B
MEAN AGE (in years)	37.96 + 6.31	36.1 + 8.12
BODY WEIGHT (in Kg)	62.84 + 6.15	62.72 + 4.78
SEX	MALE - 27 (54%) FEMALE – 23 (46%)	MALE - 26 (52%) FEMALE - 24 (48%)

There was no significant difference between the two groups in terms of age , sex and body weight.

Table 2 shows the comparison between Group A and Group B in terms of change in Mean Heart Rate:

GROUP	MEAN HEART RATE AT BASELINE	MEAN HEART RATE 3 MINS AFTER INTUBATION	P value
GROUP A	87.02 + 15.72	85.58 + 16.54	P > 0.05
GROUP B	85.26 + 17.07	93.44 + 15.89	P < 0.05

Fall in Mean Heart Rate after 3 mins of intubation was more in Group A than Group B and it was statistically significant.

Table 3 shows the comparison between Group A and Group B in terms of change in Systolic Blood pressure :

GROUP	MEAN SYSTOLIC BLOOD PRESSURE AT BASELINE	MEAN SYSTOLIC BLOOD PRESSURE 3 MINS AFTER INTUBATION	P value
GROUP A	132.90 + 14.61	131.42 + 14.68	P >0.05
GROUP B	121.98 + 17.47	138.18 + 17.22	P < 0.01

Mean Systolic Blood Pressure of patients of Group A were lower than those in group B 3mins after intubation and the differences were highly statistically significant.

Table 4 shows the comparison between Group A and Group B in terms of change in Disasystolic Blood pressure :

GROUP	MEAN DIASTOLIC BLOOD PRESSURE AT BASELINE	MEAN DIASTOLIC BLOOD PRESSURE 3 MINS AFTER INTUBATION	P value
GROUP A	81.82 + 6.54	79.46 + 8.12	P > 0.05
GROUP B	73.98 + 7.84	86.98 + 8.68	P < 0.01

Mean Diastolic Blood Pressure of patients of Group A were lower than those in group B 3mins after intubation and the differences were highly statistically significant.

Table 5 shows the comparison between Group A and Group B in terms of change in Mean Arterial Blood pressure :

GROUP	MEAN ARTERIAL BLOOD PRESSURE AT BASELINE	MEAN ARTERIAL BLOOD PRESSURE 3 MINS AFTER INTUBATION	P value
GROUP A	98.87 + 7.13	96.91 + 8.14	P > 0.05
GROUP B	89.98 + 10.02	104.04 + 10.62	P < 0.01

Mean Arterial Blood Pressure of patients of Group A were lower than those in group B 3mins after intubation and the differences were highly statistically significant.

DISCUSSION:

A stable induction is a major objective in anesthesia. Hemodynamic response to laryngoscopy and intubation was not completely abolished in any of the group. Fentanyl was most effective in blunting the post intubation increase in both heart rate and blood pressure[2].

Ezike and Nwosu, (4) and Hoda and Khan (5), Parida et al (6) also found IV Fentanyl is effective in blunting hemodynamic response to intubation. It has been observed in many studies, Kay et al (7), Black et al (8)that Fentanyl at 5 – 8 microgram / kg used as an adjunct to any inducing agent effectively blunted the cardio-vascular responses.

Wilson I.G.(9) and many others observed that IV Lignocaine at doses 1.5 microgram/kg body weight used as an adjunct to any inducing agent was effective in obtunding the pressure response to laryngoscopy and intubation Considering these studies, the aim of this study was chalked out.

In Group A the mean heart rate decreased to the statistically significant level below the baseline at 3 mins post intubation. These results corroborated with the findings of Pang et al (10).

In Group B although the mean heart rate decreased 3mins after intubation but it was still at statistically very highly above the baseline. This finding corroborated with Miller et al (11), and Fenh et al (12), who opined that Lignocaine 1.5 to 2 mg /kg was ineffective in controlling the heart rate responses due to laryngoscopy and intubation. All these observations reflected the higher efficacy of IV Fentanyl 6mg/kg in obtunding cardiovascular responses.

In Group A at 3mins post intubation mean systolic blood pressure, mean diastolic blood pressure and mean arterial pressure were below the baseline value and these were very highly statistically significant in group B in contrast at 3mins post intubation these parameters were highly significantly above the baseline value. On statistical comparison between 2 groups it was observed that at 3mins post intubation the mean SBP, DBP, MAP in group A were significantly lower than those in group B. (3), (6), (13)

CONCLUSION:

We can conclude that under the same prevailing condition intravenous Fentanyl 6mg/kg body weight provides more effective attenuation of hemodynamic responses to laryngoscopy and endotracheal intubation than intravenous Lignocaine 1.5mg/kg body weight.

LIMITATIONS:

A major limitation of our study is that stress mediators were not measured. The issue of correlation between hemodynamics and plasma catecholamine changes following tracheal intubation can be rather controvertial. Barak et al. (14), did not find a correlation between hemodynamic changes and catecholamine levels, in contrast to some authors who have observed a correlation between the hemodynamic responses associated with tracheal intubation and the changes in the plasma catecholamine concentration. In addition, the catecholamine response to tracheal intubation is the greatest in central venous samples, compared with arterial or peripheral venous samples. However, central venous cannulation was deemed not ethical in ASA I patients, and hence we refrained from the same.

REFERENCES:

1. Reid LC, Brace DE: Irritation of the respiratory tract and its reflex effect upon heart: Surg Gynaec & Obst.1940;70:157-62
2. Kumar A, Seth Anita et al: Attenuation of the hemodynamic response to laryangoscopy and tracheal intubation with Fentanyl, Lignocaine, nebulization and a combination of both: A randomized control trial, Anesthesia Essays Res.2016 Sep-Dec;10(3): 661-666
3. Gurulingappa et al.: Attenuation of cardiovascular responses to direct laryngoscopy and intubation – A comparative study between IV bolus Fentanyl, Lignocaine and Placebo (NS): J. Clin Diagn Res. 2012
4. Ezike HA, Nwosu AD. Comparison of the relative efficacy of Fentanyl premedication and repeat dose Propofol in attenuating cardiovascular response to endotracheal intubation. Niger Med J. 2010; 51: 18 – 22
5. Hoda A, Khan FA. Effect of one minimum alveolar concentration of Sevoflurane with and without Fentanyl on hemodynamic response to laryngoscopy and tracheal intubation. J Anaesthesiol Clin Pharmacol.2011; 27: 522 – 6
6. Parida S, Ashraf NC et al. Attenuation of the hemodynamic responses to tracheal intubation with gaba painting, Fentanyl and a combination of both: A randomized control trial, Indian J Anaesth.2015;59 (5): 306 – 11.
7. Kay B, Healy TE, Bolder PM. Blocking the circulatory response to tracheal intubation. A comparison of Fentanyl and Nalbuphine. Anaesthesia. 1985; 40 : 960 – 3
8. Black TE, Kay B, Healy TE. Reducing the hemodynamic responses to laryngoscopy and intubation. A comparison of alfentanyl with Fentanyl. Anaesthesia. 1984; 39: 883 – 7
9. Wilson IG, Meiklejohn BH, Smith G. Intravenous Lignocaine and sympathoadrenal responses to laryngoscopy and intubation – the effect of varying time of injection. Anaesthesia. 1991; 46 : 220 – 3
10. Pang WW et al. The effect of Tramadol versus Fentanyl in attenuating hemodynamic response following tracheal intubation. Acta-Anaesthesiol.1999;37(4):191-6
11. Miller CD, Warren SJ. IV Lignocaine fails to attenuate the cardiovascular response to laryngoscopy and tracheal intubation. Br J Anaeath.1990;65:216
12. Feng Cl et al.A comparison of Lidocaine, Fentanyl and Esmolol for attenuation of cardiovascular response to laryngoscopy and tracheal intubation.Acta-Anaesthesiol.1996;35(2):61 – 7
13. Kurek NS, Moses R et al. Attenuation of hemodynamic response to laryngoscopy and endotracheal intubation with preinduction IV Fentanyl versus combination of IV Fentanyl and sublingual Nitroglyceren spray. Med Arch.2014;68(5):339-44
14. Barak M, Zisera et al. Hemodynamic and catecholamine response to tracheal intubation: direct laryngoscopy compared with fiberoptic intubation. J Clin Anesth.2003;15 : 132 – 6