Original Research Article

Fentanyl-clonidine and fentanyl-lidocaine on attenuation of haemodynamic stress response to laryngoscopy and tracheal intubation laparoscopic surgery- A comparative study

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Abstract

Introduction: Endotracheal intubation creates a period of hemodynamic instability in normotensive patients. Endotracheal intubation produces stimulation of laryngeal and tracheal sensory receptors, resulting in a marked increase in the elaboration of sympathetic amines leading to hypertensive crisis. **Objectives:** The objective of study is to evaluate and compare the efficacy of fentanyl- clonidine and fentanyl – lidocaine combine in attenuating the stress responses to laryngoscopy and endotracheal intubation in nermotensive patients. **Material and Methods:** We conducted a prospective, randomized, double-blind study in 40 patients posted for laparoscopic surgery. All patients were randomly divided into two groups, fentanyl-clonidine (FC) group and fentanyl – lidocaine (FL) group. The FC group received Fentanyl 2 mcg/kg and clonidine 2mcg/kg and the FL group received lidocaine1.5mg/kg and fentanyl 2mcg/kg , 3 min prior to intubation. Hemodynamic parameters were recorded at baseline, after giving induction agents, and 1, 3 and 5 minutes after endotracheal intubation. **Results:** There were no significant differences between the two groups regarding hemodynamic parameters like heart rate, systolic blood pressure, diastolic and mean arterial blood pressure at before induction, 1, 3 and 5 minutes after intubation. **Conclusions:** Both fentanyl – clonidine and fentanyl – lidocaine combine effectively decreased the stress response to endotracheal intubation.
Keywords: Fentanyl, Hemodynamic stress, Intubation, Lidocaine, clonidine.

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INTRODUCTION

Endotracheal intubation can induce stress response which includes hypertension and tachycardia. These tracheal responses are mediated by sympathoadrenal responses. Endotracheal intubation of the trachea stimulates laryngeal and tracheal sensory receptors, resulting in a marked increase in the elaboration of sympathetic amines. This sympathetic stimulation results in tachycardia and elevation of blood pressure.[1-5] Thus different drugs such as local anesthetics, opioids, calcium channel blockers, short acting β-adrenergic blockers, and their combinations have been used to prevent this hemodynamic responses but none was found to be most effective.[6-12] Fentanyl, a commonly used opioid along with hypnotic agents have been used to diminish hemodynamic responses to tracheal intubation.[13-15] Furthermore, lidocaine has a suppressive effect on the circulatory responses in patients undergoing laryngoscopy and tracheal intubation[16,17.] Clonidine also has been used as a premedicant to prevent stress response to laryngoscopy and intubation[18-20.] But no single drug is adequate enough to prevent stress response to laryngoscopy and tracheal intubation. This study aimed to evaluate and to compare the efficacy of fentanyl–

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clonidine and fentanyl-lidocaine combine in attenuating haemodynamic stress responses to laryngoscopy and endotracheal intubation.

MATERIAL AND METHODS

We conducted a prospective, randomized, double-blind trial in 40 patients posted for laparoscopic surgery in the SCB medical college from March to September 2015 The study protocol was approved by the hospital ethical committee. Written informed consent was obtained from all patients. All patients were posted for elective surgery under general anesthesia. Inclusion criteria; Age < 65yrs and > 30yrs, ASA class I and II patients

Exclusion Criteria

Patients undergoing heart surgery, ASA III or above, CHF (congestive heart failure, arrhythmia, difficult airway, intubation time greater than 15 seconds. All patients were randomly divided into two groups, fentanyl–clonidine (FC) group and fentanyl-lidocaine (FL) group of 20 each. A routine pre-operative check-up was done in all patients and baseline vitals were noted. All patients were given 0.2 mg Glycopyrrolate bromide intramuscularly 30 min prior to surgery. Then patients received ringer's lactate 5ml/kg after starting an intravenous line. Patients were attached to the following monitors; ECG, noninvasive blood pressure monitor, pulse oximetery. The baseline mean arterial pressure (MAP), systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR) were recorded. All the patients were premedicated with Inj. Midazolam 0.03 mg/kg i.v. and were preoxygeneted. The FC group received 2 mcg/kg fentanyl and 2mcg/kg clonidine. FL group received 2mcg/kg fentanyl. and 1.5mg/kg lidocaine. Observer was blind to the drugs like clonidine and lidocaine which were administered by another anaesthesiologist. After 3 minutes anaesthesia was induced by propofol given in a dose of 2 mg/kg and rocuronium was given in a dose of 1 mg/kg. Then a laryngoscopy was performed by an anaesthesiologist with a standard Macintosh laryngoscope and the trachea was intubated with an appropriate size cuffed endotracheal tube. Hemodynamic variables; MAP, SBP, DBP, and HR were recorded at 1, 3 and 5 minutes after performing endotracheal intubation. We also recorded any possible complications such as; bradycardia (HR < 50) and hypotension (SBP < 90). All results were expressed as mean ± SD. Hemodynamic variables in the present study were analyzed statistically by using by using the analysis of variance (ANOVA) and Student's t-test. *P* values ≤ 0.05 were considered significant.

RESULTS

We evaluated 40 patients including 20 males (50%) and 20 females (50%) with a mean age of 53.08 ± 9.25 years. There was no significant difference between the two groups regarding HR, SBP, DBP and MAP in the patients before induction (base line), 1, 3 and 5 minutes after intubation. Table no 1, 2, 3 and 4 show changes in the hemodynamic variables in both groups.

Table 1: Mean Heart Rate in Fentanyl –clonidine and Fentanyl - Lidocaine Groups

Heart Rate Groups	Fentanyl+clonidine, Mean±SD	Fentanyl+Lidocaine, Mean±SD	P value
Before induction(baseline)	81.34±12.32	81.35±9.5	0.34
1 minutes after intubation	77.26±8.72	73.16±8.97	0.07
3 minutes after intubation	71.54±9.39	72.53±10.89	0.58
5 minutes after intubation	66.34±10.14	67.56±9.88	0.70

There was significant difference in mean heart rate between the two groups 1 minute after intubation (as shown in Table 1)

Table 2: Systolic Blood Pressure in Fentanyl-clonidine and Fentanyl - Lidocaine Groups

Systolic Blood Pressure Groups	Fentanyl+clonidine (Mean±SD)	Fentanyl+Lidocaine, (Mean±SD)	P value
Before induction	146.46±22.46	166.30±24.77	0.16
1 minutes after intubation	120.48±21.25	120.28±13.75	0.94
3 minutes after intubation	113.56±23.24	112.76±23.18	0.73
5 minutes after intubation	109.24±20.68	115.34±28.88	0.51

There was no significant difference between two groups for systolic blood pressure (as shown in table 2)

Table 3: Diastolic Blood Pressure in Fentanyl- clonidine and Fentanyl - Lidocaine Groups

Diastolic Blood Pressure Groups	Fentanyl+clonidine, Mean± SD	Fentanyl+Lidocaine, Mean±SD	P value
Before Induction	84.30±10.26	92.35±11.64	0.62
1 minutes after intubation	73.38±10.75	77.34±12.58	0.27
3 minutes after intubation	74.37±13.65	72.75±16.27	0.27
5 minutes after intubation	77.24±18.68	72.34±13.84	0.63

There was no significant difference between two groups for diastolic blood pressure (as shown in table 3)

Table 4: Mean arterial Pressure in Fentanyl - clonidine and Fentanyl - Lidocaine Groups

Mean Arterial Pressure Groups	Fentanyl+ clonidine, Mean± SD	Fentanyl+Lidocaine, Mean±SD	P value
Before Induction	96.40±12.34	98.54±13.46	0.53
1 minutes after intubation	87.46±11.68	86.42±11.82	0.33
3 minutes after intubation	84.72±12.48	82.57±15.27	0.25
5 minutes after intubation	82.24±16.74	81.46±13.64	0.41

There was no significant difference between two groups for mean blood pressure (as shown in table 4)

DISCUSSION

We found that fentanyl- clonidine and fentanyl – lidocaine combine are equally effective in decreasing hemodynamic stress responses (HR, SBP and DBP) in all patients. Endotracheal intubation is a stressful noxious stimuli, which result in a marked increase in the release of sympathetic amines (adrenaline and noradrenaline) by stimulating laryngeal and tracheal sensory receptors. In response to endotracheal intubation, there is increase in blood pressure, increases in heart rate and tachyarrhythmia arising essentially due to sympathetic stimulation.[21-24] These hemodynamic responses to intubation were controlled effectively in our patients by using two drugs combine like fentanyl – clonidine and fentanyl- lidocaine. Different previous studies have proved the efficacy of single study drug administration before intubation in normotensive patients. Neither any combination of drug nor any study in hypertensive patients has been done. Tripathi *et al* has studied that Clonidine, 2 µg/ kg intravenously, 30 min before induction is safe and effective in preventing the hemodynamic stress response during laparoscopic cholecystectomy.[19] According to Ali *et al*. in 2010, pre-treatment with lidocaine improves intra- and post-operative hemodynamic stability during laparoscopic surgery without prolonging recovery.[25] Our study was in line with some previous studies such as Shin *et al*. that compared the effects of lidocaine, fentanyl, Nicardipine and Esmolol, on the hemodynamic response during intubation and those studies showed that all the agents are effective in producing hemodynamic stability.[26] According to Levitt *et al*. Esmolol and lidocaine have similar efficacies to attenuate moderate hemodynamic responses to intubation in patients with isolated head trauma.[27] Additionally, Malde and Sarode in a 2007 study compared lignocaine and fentanyl efficacy on hemodynamic stability and revealed that lignocaine and fentanyl both attenuated the rise in heart rate, however, fentanyl produced better results. Lignocaine attenuated the rise in blood pressure with intubation while fentanyl inhibits it totally.[28] Feng CK showed that only esmolol could reliably offer protection against the increase in both HR and SBP, low dose of fentanyl (3 micrograms/kg) prevented hypertension but not tachycardia, and 2 mg/kg lidocaine had no effect to blunt adverse hemodynamic responses during laryngoscopy and tracheal intubation.[29] Kulka *et al* shown that Intravenous Clonidine is effective in reducing Stress Response During Induction of Anesthesia in Coronary Artery Bypass Graft Patients. Marco P.[30] Gurulingappa in his study found that attenuation of pressor response is seen both with lignocaine and fentanyl up to different extent. Of the two drugs fentanyl 4mgicrogram i.v. bolus provides a consistent, reliable and effective attenuation as compared to lignocaine 1.5mg/kg iv. bolus.[31] So fentanyl at 2mcg/kg may not be sufficient to blunt the stress response alone. Marco P also studied that Preoperative clonidine attenuates stress response during emergence from anesthesia.[32] Matot studied the effect of clonidine premedication on hemodynamic responses to microlaryngoscopy and rigid bronchoscopy and found its effectiveness.[33] Sameena kousar compared effect of Fentanyl and Clonidine for Attenuation of the Haemodynamic Response to Laryngocopy and Endotracheal Intubation and found that Clonidine showed better attenuation of the sympathetic response.[34] Valiallah compared Fentanyl and Fentanyl Plus Lidocaine on attenuation of hemodynamic responses to Tracheal Intubation in controlled hypertensive patients undergoing general anesthesia and found that fentanyl and fentanyl plus lidocaine effectively decreased the hemodynamic response to tracheal intubation and fentanyl plus lidocaine was not more effective than fentanyl alone.[35] Our study shown that both FC and FL combine effectively prevented hemodynamic responses to tracheal intubation.

CONCLUSION

Fentanyl-clonidine and fentanyl - lidocaine combine are equally effective in decreasing the hemodynamic stress response to tracheal intubation. Perioperative haemodynamic stability was an added advantage in both the groups. Study has been limited in choosing the best single drug to prevent stress response perticularly in hypertensive patients. So more studies should be taken up wheather combination of drug may be more effective than a single drug.

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