

A Comparative Study of Dexmedetomidine and Fentanyl in Attenuating Stress Response during Direct Laryngoscopy and Tracheal Intubation

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Citation this Article: Dr Kushal Jethani, Dr Khushboo, Dr Seethal Ann, “A Comparative Study of Dexmedetomidine and Fentanyl in Attenuating Stress Response during Direct Laryngoscopy and Tracheal Intubation”, IJMSIR- July - 2020, Vol – 5, Issue - 4, P. No. 57 – 61.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

This study was done to compare effect of dexmedetomidine and fentanyl in attenuating stress response during intubation under general anesthesia. Eighty adult patients were randomly divided to 2 groups of 40 each. Group D: receiving 0.5mcg/kg Dexmedetomidine diluted to 10ml NS. Group F: receiving 2mcg/kg Fentanyl diluted to 10ml NS. Heart rate, systolic blood pressure & diastolic blood pressure were recorded prior to drug, then at 1 min after drug administration, and at 30 sec, 1, 2, 4, 8 & 10 minutes after intubation. Side effects like bradycardia, hypotension, sedation, nausea were noted. Group D had lower heart rate at all time intervals. Systolic BP and diastolic BP were lower in group D from 30 sec after endotracheal intubation till end of study ($p \leq 0.05$). Bradycardia was found in 3 patient in group D. We concluded that dexmedetomidine is more effective than fentanyl in attenuation of stress response during endotracheal intubation.

Keywords : Dexmedetomidine, Fentanyl, stress response, Laryngoscopy, tracheal intubation.

Introduction

Cardiovascular responses to direct laryngoscopy and endotracheal intubation include tachycardia and hypertension¹. This sympathetic response occurs by stimulation of airway leading to unpredictable and variable increase in heart rate and blood pressure. This can be hazardous to patients with pre existing hypertension, myocardial insufficiency and cerebrovascular disease which may lead to acute left ventricular failure, intra operative myocardial infarction and cerebrovascular accidents in these patients^{2, 3, 4}. Various pharmacological agents can be used to attenuate this stress response to intubation like use of volatile anaesthetics to increase the depth of anaesthesia,⁵ IV and topical lidocaine,^{6,7} opioids,⁸ and sodium nitroprusside⁹. Dexmedetomidine is a selective α_2 adrenergic agonist with sympatholytic and sedative effects. Presynaptic activation of α_2 adrenergic receptors inhibits sympathetic activity and therefore can

decrease heart rate and blood pressure. Fentanyl, an opioid agonist chiefly acts on mu receptors. It is cardiovascular stable and has rapid onset and short duration of action. It is effective in attenuating the stress response during endotracheal intubation without any adverse effects in low doses. Aim of our study was the comparison of Dexmedetomidine and fentanyl in attenuating the stress response to direct laryngoscopy and endotracheal intubation.

Material & Method

This prospective, randomized, double blind study was conducted on eighty patients aged between 20yrs and 50yrs of ASA grade I & II scheduled for various elective surgeries under general anaesthesia. Patients with cardiopulmonary diseases, hepatic or renal dysfunction, pregnant or lactating patients & any patient who required ventilation in postoperative period were excluded from study. The study population was divided into 2 groups of 40 patients each.

Group D (n=40) = Received 0.5mcg/kg Dexmedetomidine diluted to 10ml normal saline

Group F (n=40) = Received 2mcg/kg Fentanyl diluted to 10ml NS

Premedication was done with inj. glycopyrrolate 0.2 mg IM 30 min before shifting to OT. Upon arrival of the patient in the operation theatre, intravenous access was established. Basal haemodynamic parameters were recorded. Injection Dexmedetomidine 0.5mcg/kg and injection Fentanyl 2 mcg/kg, both diluted in 10 ml NS were given in groups D and F respectively, 10 minutes before laryngoscopy and intubation. Preoxygenation was done with 100% oxygen for 3 minutes. All patients were induced with inj. Propofol 2mg/kg i.v. and inj. Succinylcholine 2mg/kg i.v. followed by direct laryngoscopy and endotracheal intubation. Heart rate(HR), systolic blood pressure(SBP), diastolic blood

pressure(DBP), SPO2 were recorded at 1 min after study drug administration, and then at 30 seconds, 1 min, 2 mins, 4 mins, 8mins & 10mins after intubation. Patients were maintained with Isoflurane (0.6%v/v), O2- N2O (50%-50%) and injection atracurium loading dose 0.25mg/kg and intermittent dose 0.1mg/kg. Reversal at the end of surgery was done with inj. Glycopyrrolate 0.5mg and inj. Neostigmine 2.5mg. Any complications like bradycardia, hypotension, nausea, bronchospasm during intraoperative and post operative period were noted. Statistical analysis done using SPSS 17.0 version. Student's t test was used for analysis of quantitative data. p-value <0.05 was regarded as statistically significant.

Results

The patients in both groups were comparable for age, sex, weight (table no.1) and difference was insignificant ($p>0.05$). Mean heart rate in the dexmedetomidine group was lower in comparison to the fentanyl group at all the study time intervals ($P<0.05$). In our study, SBP and DBP was lower in Groups D as compared to Group F at 30 sec. after intubation to till the end of study ($p<0.05$). No significant difference was observed in SpO2 after intubation until end of study in both groups. Beside these, no untoward side effects were found in both the groups. Bradycardia was seen in 3 patients in group D for which inj. atropine 0.6mg was given.

Table 1: Demographic Profile Of 2 Groups (Mean \pm SD)

Variables	Group D	Group F
Age (yrs)	33.73 \pm 7.75	34.17 \pm 7.22
Sex (m:f)	11:19	12:18
Weight (Kg)	60.81 \pm 8.74	61.1 \pm 8.10

Diastolic Blood Pressure (mm of Hg)			
Time (in min.)	Group D	Group F	p-value
Basal	75.33 ± 6.58	76.60 ± 6.33	>0.05
1 min after drug	66.94 ± 5.52	67.80 ± 5.03	>0.05
30 sec AI	70.60 ± 5.74	78.93 ± 6.36	<0.05
1 min AI	72.87 ± 5.46	82.87 ± 6.53	<0.05
2 min AI	72.40 ± 5.85	80.80 ± 6.32	<0.05
4 min AI	68.00 ± 5.83	78.80 ± 6.62	<0.05
8 min AI	65.73 ± 5.22	74.80 ± 6.96	<0.05
10 min AI	61.93 ± 5.02	72.53 ± 6.95	<0.05

Table 2
Haemodynamic parameters in the study groups

Heart Rate (beats/min)			
Time (in min.)	Group D	Group F	p-value
Basal	78.83 ± 8.99	79.27 ± 8.20	>0.05
1 min after drug	70.10 ± 6.99	80.20 ± 7.85	< 0.05
30 sec AI	75.87 ± 7.06	87.03 ± 7.91	< 0.05
1 min AI	76.60 ± 6.78	88.87 ± 7.52	< 0.05
2 min AI	76.97 ± 6.52	88.67 ± 6.87	< 0.05
4 min AI	74.60 ± 5.19	85.90 ± 7.35	< 0.05
8 min AI	70.23 ± 5.85	84.20 ± 7.35	< 0.05
10 min AI	67.07 ± 4.25	83.63 ± 8.47	< 0.05

Systolic Blood Pressure (mm of Hg)			
Time (in min.)	Group D	Group F	p-value
Basal	124.07 ± 7.80	125.60 ± 7.89	>0.05
1 min after drug	116.87 ± 6.62	117.60 ± 7.90	>0.05
30 sec AI	120.13 ± 8.07	130.07 ± 8.38	<0.05
1 min AI	118.13 ± 8.07	133.00 ± 7.32	<0.05
2 min AI	115.73 ± 7.22	128.27 ± 8.35	<0.05
4 min AI	108.60 ± 6.29	122.13 ± 5.37	<0.05
8 min AI	107.33 ± 6.45	117.67 ± 7.45	<0.05
10 min AI	105.93 ± 5.88	115.33 ± 8.37	<0.05

Discussion

The stress response to endotracheal intubation in form of hypertension, tachycardia and arrhythmias may be potentially dangerous. Complications like cardiac failure, myocardial ischaemia, intracranial haemorrhage and increase in ICP may occur following laryngoscopy. Variety of pharmacological agents have been in use to attenuate these haemodynamic response and the search for ideal technique or agents still continues. Both dexmedetomidine and fentanyl, due to their central mechanism of action, have ability to control haemodynamic responses, and suppress the gag and cough reflexes during laryngoscopy and endotracheal intubation. In our study, heart rate was significantly lower in group D as compared to group F after study drug administration till end of study. The results of our study were in accordance with the work done by

Kharwar RK et al¹⁰ and Gandhi S et al¹¹. They also found the similar results. Systolic blood pressure and diastolic blood pressure were significantly lower in Dexmedetomidine group from 30 sec after intubation till end of study. Similar finding observed by Patel ND et al¹², Jain V et al¹³ and Das et al¹⁴. Lawrence et al¹⁵ in their study found that a single dose of dexmedetomidine before induction of anaesthesia attenuated the haemodynamic stress response to intubation and extubation. In our study, we observed bradycardia response in 3 subjects in Group D. This is similar to study done by Patel CR et al¹⁶.

Conclusion

Our study concluded that both dexmedetomidine and fentanyl attenuated the hemodynamic stress response. Dexmedetomidine, in comparison to fentanyl, provides effective attenuation of pressor response to laryngoscopy and intubation.

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