



A COMPARATIVE CLINICAL STUDY OF DEXMEDETOMIDINE AND FENTANYL IN ATTENUATING STRESS RESPONSE DURING LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION

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ABSTRACT This study was designed to compare effect of dexmedetomidine and fentanyl on cardiovascular responses during intubation under general anesthesia. Sixty adult patients were randomly recruited to 2 groups of 30 each. Group D: Dexmedetomidine group (0.5mcg/kg diluted to 10ml NS). Group F: Fentanyl group (2mcg/kg diluted to 10ml NS). Heart rate, systolic & diastolic blood pressure were recorded prior to drug, 1 min after drug administration, at 30 sec, 1, 2, 3, 5, 7 & 10 minutes after intubation. Side effects like bradycardia, hypotension, nausea, shivering & desaturation also noted. Heart rate was lower in group D at all time intervals. Systolic and diastolic BP was lower in group D from 30 sec after intubation till end of study ($p \leq 0.05$). Bradycardia was found in 2 patient in group D. We concluded that dexmedetomidine is more efficacious than fentanyl in attenuation of stress response during intubation period.

KEYWORDS : Stress Response, Intubation, Fentanyl, Dexmedetomidine

INTRODUCTION:

Cardiovascular responses to laryngoscopy and tracheal intubation include hypertension and tachycardia¹. This sympathetic response is provoked by stimulation of airway leading to transitory, variable and unpredictable increase in heart rate and blood pressure. They are hazardous to patients with hypertension, myocardial insufficiency and cerebrovascular disease which may lead to intra operative myocardial infarction, dysrhythmias, acute left ventricular failure and cerebrovascular accidents in these predisposed patients^{2,3,4}.

Various pharmacological agents have been used to attenuate the stress response to endotracheal intubation. These include increasing the depth of anaesthesia with volatile anaesthetics,⁵ topical and IV lidocaine,^{6,7} opioids,⁸ and vasodilators like sodium nitroprusside⁹.

Dexmedetomidine is a highly selective α_2 adrenergic agonist with sedative, anxiolytic, sympatholytic effects. Postsynaptic activation of α_2 adrenergic receptors in the central nervous system inhibits sympathetic activity and therefore can decrease blood pressure and heart rate. Fentanyl is a synthetic opioid agonist chiefly acts on mu receptors. It has various advantages like cardiovascular stability, rapid onset and short duration of action. It is effective in attenuating the increase in pulse rate and blood pressure following tracheal intubation without any adverse effects in low doses. Aim of our study was to study the comparison of Dexmedetomidine 0.5mcg/kg and fentanyl 2mcg/kg in attenuation stress response in laryngoscopy and intubation.

MATERIAL & METHOD:

The present study was approved by the ethics committee of the institution. This study was conducted as prospective, randomized, double blind study. Sixty patients aged between 18yrs and 65yrs of ASA grade I & II for various elective surgeries requiring general anaesthesia randomly selected for the study. Patients with cardiopulmonary diseases, hepatic dysfunction, renal dysfunction, psychiatric illness, pregnant and lactating patients & any patient who required postoperative ventilation were excluded from study. After taking written informed consent from patients preanaesthetic assessment of all the selected patients were done with complete history and physical examination. Routine investigations like complete blood count, blood sugar, blood urea, serum creatinine, chest X-ray and ECG were done.

The study population divided into 2 groups of 30 patients each.

Group D (n=30) = Dexmedetomidine group (0.5mcg/kg diluted to 10ml normal saline)

Group F (n=30) = Fentanyl group (2mcg/kg diluted to 10ml NS)

Patients were kept nil orally for 6 hours before procedure. All patients were premedicated with inj. glycopyrrolate 0.2 mg IM 30 min before shifting to operation theatre. Upon arrival of the patient in the operation

theatre, intravenous access with 18 G cannula was established. Basal haemodynamic parameters were recorded.

Patients were medicated with inj. pentazocine IV 0.5 mg/kg. Injection Dexmedetomidine 0.5mcg/kg diluted in 10 ml NS and Injection Fentanyl 2 mcg/kg diluted in 10 ml NS in groups D and F respectively, were administered intravenously 10 minutes before laryngoscopy and intubation. Preoxygenation done with 100% oxygen for 3 minutes.

Patients were induced with inj. Propofol (2mg/kg) i.v. and inj. Succinylscoline (2mg/kg) i.v. followed by laryngoscopy and intubation. Heart rate, systolic blood pressure, diastolic blood pressure, SPO₂ were monitored at 1 min after study drug administration, 30 seconds after intubation and then every one minute up to 3 mins, 5 mins, 7mins & 10mins after intubation. Patients were maintained with Isoflurane (0.6%v/v), O₂ (50%), N₂O (50%) and inj atracurium loading dose 0.25mg/kg and intermittent dose 0.1mg/kg. At the end of surgery, patients were reversed with inj. Glycopyrrolate 0.5mg and inj. Neostigmine. 2.5mg Patients were watched for any complication like nausea, shivering, bradycardia, hypotension, arrhythmias, bronchospasm during intraoperative and post operative period The observations were recorded and subjected to statistical analysis using statistics calculator SPSS 17.00 version. Student's t test was used for analysis of quantitative data. p-value <0.05 was taken statistically significant.

RESULTS:

The patients in both groups were comparable for age, sex, weight (table no.1). The difference was insignificant ($p > 0.05$).

TABLE 1: Demographic profile of 2 groups (mean±SD)

Variables	Group D	Group F
Age (yrs)	32.33±9.75	34.37±12.22
Sex (m:f)	11:19	13:17
Weight (Kg)	60.61±9.74	61.4±9.10

TABLE 2: Haemodynamic parameters in the study groups

Time (in min.)	Heart rate		
	Group D	Group F	p-value
Basal	79.33 ± 8.99	79.77 ± 8.20	0.86
1 min after drug	73.10 ± 6.99	77.20 ± 7.85	0.037
30 sec AI	75.87 ± 7.06	87.03 ± 7.91	0.00
1 min AI	77.60 ± 6.78	87.87 ± 7.52	0.00
2 min AI	78.97 ± 6.52	87.67 ± 7.87	0.00
3 min AI	79.50 ± 6.15	86.03 ± 7.33	0.00
5 min AI	76.60 ± 6.19	82.90 ± 7.35	0.001
7 min AI	72.23 ± 5.82	82.20 ± 7.65	0.00
10 min AI	69.07 ± 5.25	81.63 ± 7.47	0.00

AI- after intubation Basal heart rate, SBP and DBP were comparable

SBP				DBP		
TIME IN MIN.	Group D	Group F	p-value	Group D	Group F	p-value
Basal	127.07 ± 7.80	125.60 ± 7.89	0.472	76.93 ± 6.58	75.67 ± 6.33	.456
1 min after drug	114.87 ± 6.62	117.60 ± 7.90	0.152	67.93 ± 5.72	68.80 ± 6.03	.57
30 sec AI	120.13 ± 7.07	125.07 ± 8.38	0.017	71.60 ± 5.74	74.93 ± 6.36	.037
1 min AI	120.13 ± 7.07	125.00 ± 8.32	0.018*	73.87 ± 5.46	74.87 ± 6.53	.518
2 minAI	121.73 ± 7.22	128.27 ± 8.75	0.003	73.40 ± 5.85	76.80 ± 6.32	.035
3 min AI	120.13 ± 7.07	125.67 ± 8.55	0.008	71.73 ± 5.72	75.20 ± 6.40	.031
5 minAI	115.60 ± 7.29	120.13 ± 8.37	0.029	68.00 ± 5.83	72.80 ± 6.62	.004
7 minAI	111.33 ± 6.55	116.67 ± 7.85	0.006	65.73 ± 5.22	70.80 ± 6.96	.002
10 mi AI	107.93 ± 4.88	114.33 ± 7.37	0.00	61.93 ± 5.02	70.53 ± 6.95	0.000

($P > 0.05$) between the two groups. Mean heart rate in the fentanyl group was higher in comparison to the dexmedetomidine group at all the study time intervals ($P < 0.05$). Our study showed that SBP was lower in Groups D at 30 sec. after intubation to till end of study ($p < 0.05$). A significant difference was present in DBP between groups D and F at 30 sec, after intubation and 2 & 3 min after intubation ($p < 0.05$). After that difference became highly significant till end of study ($p < 0.01$). No significant difference was observed in respiratory rate and SpO_2 after intubation until end of study in both groups. Beside these, no untoward side effects found in both groups. Bradycardia found in 2 patients in group D for which inj. atropine 0.6mg was given.

DISCUSSION:

The pressor response to endotracheal intubation in form of tachycardia, hypertension and arrhythmias may be potentially dangerous. Complications of pressor responses that follow laryngoscopy include myocardial ischaemia, cardiac failure, intracranial haemorrhage and increase in ICP. A wide variety of pharmacological agents were used to attenuate the haemodynamic response. The search for ideal technique or agents for attenuation of haemodynamic changes still continues. Both dexmedetomidine and fentanyl have ability to control haemodynamic responses, suppress the gag, laryngeal and cough reflexes during laryngoscopy and endotracheal intubation by virtue of their central mechanism of action.. Hence, we thought it would be appropriate to compare the effectiveness of the two drugs for attenuation of the pressor response to laryngoscopy and endotracheal intubation. In our study heart rate was significantly lower in group D after study drug administration till end of study as compared to group F. Kharwar RK et al¹⁰ conducted a study to evaluate the effect of dexmedetomidine and fentanyl for attenuation of haemodynamic responses during laryngoscopy and intubation. It was observed in this study that after laryngoscopy and intubation, increase in pulse rate was more in fentanyl group than in dexmedetomidine group. Gandhi S et al¹¹ also found similar results. Systolic and diastolic blood pressure was significantly lower in group D from 30 sec after intubation till end of study. Similar finding observed by Das et al¹², Patel ND et al¹³ & Jain V et al¹⁴. Jaakola et al¹⁵ in their study found that a decreased BP and HR response occurs during intubation following the administration of 0.6 mcg/ kg bolus of dexmedetomidine preoperatively.

In a study by Lawrence et al¹⁶ found that a single dose of dexmedetomidine before induction of anaesthesia attenuated the haemodynamic response to intubation and extubation. In our study, we observed bradycardia response in 2 subjects in Group D. This is similar to study done by Patel CR et al¹⁷.

CONCLUSION:

It was concluded that both the drugs attenuated the pressor response. Among the two drugs administered, dexmedetomidine provides reliable and effective attenuation of pressor response to laryngoscopy and intubation when compared to fentanyl.

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