A Comparison Of Intravenous Dexmedetomidine V/S Inj. Fentanyl For Attenuation Of Hemodynamic Responses During Laryngoscopy And Intubation After Propofol Induction

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Abstracts: **Background And Objective:** Alpha-2 agonists are being increasingly used as adjuncts in general anaesthesia, Fentanyl an opioid analgesic, is popular as an intraoperative agent due to the cardiovascular stability provided by it, even in critically ill patients.Present study was carried out to evaluate the effect of dexmedetomidine and fentanyl for attenuation of haemodynamic responses during laryngoscopy and tracheal intubation. **Methods:** Sixty patients scheduled for elective general surgery under general anaesthesia were randomized into two groups: A and B (n=30 in each group). Study group A patients were given inj. dexmedetomidine 1µg kg-1 diluted to 20ml normal saline infused in 10 minutes with infusion pump and group B were given inj. fentanyl 2µg kg-1 diluted to 20ml normal saline infused in 10 minutes with infusion pump, inj. Propofol (2mg/kg) i.v were used as induction agent. Anaesthesia was maintained with 40:60 oxygen: nitrous oxide, isoflurane (0.6%) and muscle relaxant vecuronium bromide in incremental doses throughout the surgery. Haemodynamic parameters were recorded at regular intervals during induction, intubation, surgery and extubation. **Results:** After induction there was significant decrease in pulse rate with dexmedetomidine and significant decrease in Mean blood pressure was seen with fentanyl group. After laryngoscopy and intubation, increase in pulse rate and mean arterial blood pressure was more in fentanyl group than in dexmedetomidine group. **Interpretation and Conclusion:** we conclude that dexmedetomidine 1µg/kg is more effective in attenuating hemodynamic pressure responses to laryngoscopy and intubation than 2µg/kg fentanyl when given as premedication.[DKharwar R NJIRM 2014; 5(3) :71-75]

Key Words: Laryngoscopy and intubation, hemodynamic responses, dexmedetomidine, fentanyl, Propofol.

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Introduction: Direct laryngoscopy and tracheal intubation predictably leads to tachyarrhythmia and hypertension which are usually transient and variable1,2,3,4. Usually these changes are well tolerated by healthy individuals, but fatal particularly in patients with untreated hypertension, coronary artery disease or intracranial aneurysm or hypertension. These cardiovascular effects were first described by Reid and Brace5.The cardiovascular response is a reflex phenomenon and is mediated by vagus nerve (X-cranial nerve) and glossopharyngeal (IX- cranial nerve) nerve. Vagus and glossopharyngeal nerve carry the afferent stimulus from epiglottic and infraglottic region and activate the vasomotor centre to cause a peripheral sympathetic adrenal response to release adrenaline and nor-adrenaline 6.The non pharmacological methods like smooth and gentle intubation with a short duration of laryngoscopy, insertion of LMA in place of endotracheal intubation and blocking glossopharyngeal and superior laryngeal nerves have been used to attenuate the cardiovascular response to laryngoscopy and endotracheal intubation7,8. Takita K et al 9 studied the attenuation of the cardiovascular response to endotracheal intubation by tracheal lidocaine. Kulka PJ et al 10 studied the dose response effect of intravenous clonidine on stress response during induction of anaesthesia in coronary artery bypass graft patients. None of the above approaches have proved to be ideal.

Fentanyl, an opioid analgesic, is popular as an intraoperative agent due to the cardiovascular stability provided by it, even in critically ill patients. Fentanyl has been used as premedication and its comparison has been done with other group of drugs to evaluate the attenuation of sympathetic response during laryngoscopy and intubation.The clinically effective dose of fentanyl to attenuate hemodynamic responses to laryngoscopy and intubation starts at 2µg kg-1, and is at a maximum aof 8 µg kg-1 (Bruder N et al)11,12.

Dexmedetomidine, the pharmacologically active d-isomer of medetomidine (4,[5]-[1-(2,3-dimethylphenyl) ethyl] imidazole is a highly specific

and selective □ 2 adrenoreceptor agonist.13,14 that has been shown to have sedative, analgesic and anaesthetic sparing effects.15,16 It causes a dose-dependent decrease in arterial blood pressure and heart rate, associated with decrease in serum norepinephrine concentration.

A basic need is continuously felt among the anaesthesiologist fraternity for the desired availability of a drug that effectively suppresses all the hazardous responses to obnoxious stimuli with a maximum safety margin. With an emphasis on multidimensional features of dexmedetomidine, and a very well known drug fentanyl we designed a randomized, prospective, double-blinded study to determine whether the dexmedetomidine or fentanyl would decrease the attenuation of haemodynamic response during laryngoscopy, tracheal intubation.

Materials And Methods: After obtaining approval from the institutional ethical committee, a randomised controlled study was formulated. The study population comprised 60 patients with ASA physical status I and II, aged 18–60 years of age of either sex, scheduled for elective surgery under general anaesthesia. Written informed consent was taken from each patient.After pre-anaesthetic check-up all patients were kept fasting for 8 hours prior to surgery.

On arrival to operation theatre routine monitoring was started and base line vital parameters of heart rate, NIBP - including systolic, diastolic and mean arterial pressure, oxygen saturation (SpO2), and ECG were recorded. An intravenous line was secured and Ringer lactate was started.

All patients received premedication as intravenous Inj. Midazolam (0.02mg/kg) and inj. glycopyrrolate (0.005mg/kg). In group A patients were given inj. dexmedetomidine 1µg kg-1 diluted to 20ml normal saline infused in 10 minutes with infusion pump and group B were given fentanyl 2µg kg-1 diluted to 20ml normal saline infused in 10 minutes with infusion pump. Study medication was prepared by an anaesthesiologist who was blinded to the randomization schedule. After preoxygenation for 3 min with 100% oxygen by face mask, induction was done with Propofol 2 mg kg-1, followed by vecuronium bromide 0.1mg kg-1 to facilitate direct laryngoscopy and intubation done in all patients. After intubation anaesthesia was maintained with oxygen + nitrous oxide (40% + 60%), isoflurane (0.6%) and muscle relaxant vecuronium bromide in incremental doses throughout the surgery. After intubation patient was monitored for 10 minutes and surgical incision was given after 10 minutes. The patients were mechanically ventilated to keep normocapnia. At the end of surgical procedure, the residual neuromuscular blockade was antagonized with appropriate doses of neostigmine (0.05 mg/kg) and glycopyrrolate (0.02 mg/kg) and extubation was performed when respiration was adequate and patient was able to obey verbal commands.The Non-invasive blood pressure, heart rate, and SpO2 were continuously monitored and recorded baseline, after induction, 1 minute after intubation, then at 1 min. interval until 10 min after intubation then at the interval of 5 min till the end of surgery. 5 lead ECG was attached for any change in rhythm, arrhythmia. Patients were observed post-operatively for 24 hour for complications like hypotension, hypertension, bradycardia,tachycardia, arrhythmias, hypoxemia and bronchospasm,nausea ,vomiting and shivering .

Statistical Analysis: The results obtained in the study are presented in tabulated manner and analysed using Microsoft Excel and SPSS software (version 10, 2010) for windows. . Statistical analysis was carried out using analysis of variance, chi-square test, Student's t test. Hemodynamic variables were expressed as Mean ± SD. P value <0.05 was regarded as statistically significant, P value <0.001 was taken as highly significant and P value >0.05 was regarded as non significant.

Observations And Results: The present study was undertaken on 60 patients. In this present prospective clinical study, dexmedetomidine 1µg/kg (group A) or Fentanyl 2 µg /kg (group B) were used as premedication intravenously in either group. The sample size was adequate and each group consisted of 30 patients. The observations are summarized in the following tables and graph.

Results: After induction with Propofol there was significant decrease in pulse rate with dexmedetomidine significant decrease in Mean blood pressure was seen with fentanyl group. After

laryngoscopy and intubation, increase in pulse rate and mean arterial blood pressure was more in fentanyl group than in dexmedetomidine group.Adverse effects intra-operative and post-operative like bradycardia were observed in one patient and hypotension in three patients nausea and vomiting in three patient of dexmedetomidine group. In fentanyl group, nausea and vomiting were observed in four patients.

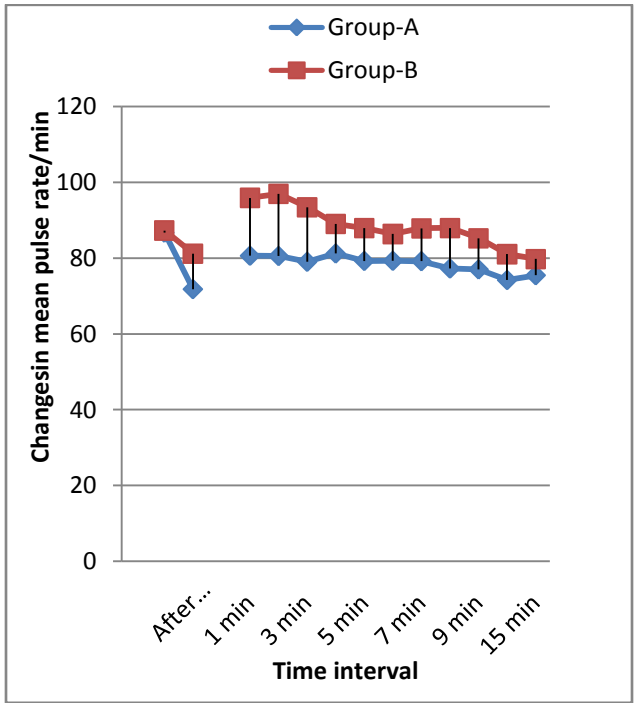
Table 1: Demographic Data

	Group A (n=30)	Group B (n=30)	P value
Age (yrs) Mean ±SD	34.63 ±14.01	34.26 ±13.39	0.91
Weight (kg) Mean ± SD	54.71 ±7.10	55.26 ±9.49	0.80
Sex (male/female) No.	13 / 17	16 /14	

*P value < 0.05 = significant, > 0.05 = non significant

Demographic data showing Mean Age, Weight and Sex distribution among both groups in table 1.

Figure 1: Changes in Pulse Rate / min in Group A and B



*p value < 0.05 = significant, < 0.001 = highly significant, > 0.05 = non significant.

Figure 2: Changes in Mean blood pressure (mm Hg) in Group A and B

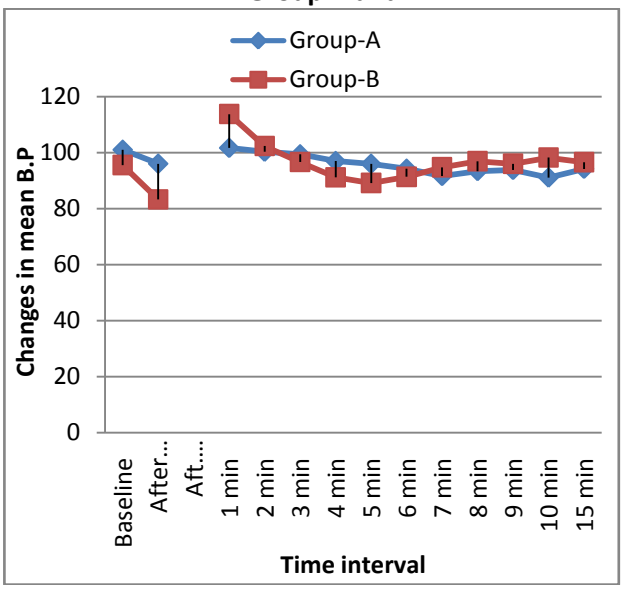


TABLE 2 : Side Effects And Complications (Intraoperative And Postoperative)

	Group A (n=30)	Group B (n=30)	p value
Hypotension	03	0	0
Hypertension	0	0	0
Bradycardia	01	0	0
Tachycardia	0	0	0
Arrhythmias	0	0	0
Hypoxemia	0	0	0
Broncospasm	0	0	0
Nausea/Vomiting	03	04	0
Shivering	0	0	0
Total	07	04	

Discussion: It is well established fact that hemodynamic responses occur during laryngoscopy and intubation. It includes cardiovascular responses of elevated blood pressure and pulse rate, occasional dysarrythmias, cough reflex, increased intracranial pressure and increased intraocular pressure. If no specific measures are taken to attenuate these hemodynamic responses, the pulse rate can increase from 26% to 66% depending on the method of induction, and arterial systolic blood pressure can increase from 36% to 45% 17,18. A.D. Malde et al 19 designed a study to compare the efficacy of single

bolus doses of fentanyl (2µg/kg) or lignocaine (1.5 mg/kg) for attenuation of pressor response to laryngoscopy and endotracheal intubation. They concluded that Lignocaine and fentanyl both attenuated the rise in pulse rate, though fentanyl was better. Lignocaine attenuated the rise in blood pressure with intubation whereas fentanyl prevented it totally. Feld JM et al 20 used fentanyl 0.5 µg kg-1 bolus,0.5 µg kg-1 hr-1 or dexmedetomidine 0.5 µg kg-1 bolus, 0.4 µg kg-1 hr-1 combined with desflurane for bariatric surgery and found that dexmedetomidine when used to substitute for fentanyl attenuated blood pressure and provided postoperative analgesia.Yildiz, Munise et al 21 conducted a study to evaluate effect of single pre-induction intravenous dose of dexmedetomidine 1 µg kg-1 on cardiovascular response resulting from laryngoscopy and endotracheal intubation. It was seen that dexmedetomidine blunted the hemodynamic response during laryngoscopy and reduced opioid and anaesthetic requirement. Recep Aksu A et al22 compared the effects of intravenous dexmedetomidine (0.5 µg/kg)versus fentanyl (1µg/kg) given 5 minutes before extubation on airway reflexes and hemodynamic responses to tracheal extubation during rhinoplasty in 40 patients. They suggest that dexmedetomidine was more effective in attenuating airway reflex responses to tracheal extubation and maintaining hemodynamic stability without prolonging recovery compared with fentanyl.

The mean age in group A was 34.63±14.01 years, in Group B it was 34.26±13.39 years, from table-1, the two groups were statistically comparable in terms of age distribution (p value > 0.05). In Group A, 43.33% of patients were male and Group B, 53.33% of patients were male. In Group A, 56.67% of patients were females and in Group B, 46.37% of patients were females. Mean weight of the patients was 54.71±7.10 Kg in Group A and 55.26 ± 9.44 kg in Group B, from table-1, the two groups were statistically comparable in terms of mean weight (p value > 0.05).In this study after induction in fentanyl group, there was 12.80% decrease in Mean blood pressure, from baseline where as in dexmedetomidine group there was 4.91% decrease in Mean blood pressure from baseline. There was decrease in pulse rate from baseline by 17.80% in dexmedetomidine group as compared to that in fentanyl group where the decrease was 6.99% from baseline after induction,the pulse rate at 1minute interval after intubation with baseline we observed an increase of 09.85% from baseline in fentanyl group and decrease of 7.03% from baseline in dexmedetomidine group,the Mean blood pressure increased by 18.99% in fentanyl group 1 min after intubation and 0.66% in dexmedetomidine group from the baseline values In our present study bradycardia (pulse rate <50/minute) was observed in one patient of dexmedetomidine group during intraoperative which was treated with Intravenous atropine 0.6 mg and then patient remained stabilized. Hypotension (systolic blood pressure <90 mmHg) was observed in three patients of dexmedetomidine group intraoperatively. In two patients hypotention was corrected by giving intravenous fluids and in one patient intravenous inj. mephentermine 6mg was given along with rapid fluid infusion. No such episode was observed in fentanyl group. In the recovery room 3 patients of dexmedetomidine group and 4 patients of fentanyl group experienced nausea and vomiting which was managed by IV inj. Ondensetrone 4mg.

Conclusion: Based on the results of our study and the above discussion, we conclude that inj. dexmedetomidine 1µg/kg, i.v is more effective in attenuating hemodynamic pressure responses to laryngoscopy and intubation than inj. fentanyl 2µg/kg, i.v when given as premedication.

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