Research Article

Evaluation of two different doses of Dexmedetomidine in attenuation of pressor response during laryngoscopy and intubation

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Abstract

Introduction: Pressor response to laryngoscopy and intubation have been associated with sympathetic and parasympathetic responses like Hypertension, Tachycardia due to increased plasma catecholamine concentrations. Premedication with Dexmedetomidine attenuates pressor response to laryngoscopy and intubation. **Aims and Objective:** to evaluate and compare effects of 2 different doses of Dexmedetomidine 1mcg/kg and 0.6mcg/kg in attenuating pressor response to laryngoscopy and intubation. **Methods:** 60 patients aged 18-50 years of either sex of ASA grade I and II scheduled for elective surgery were randomly divided into 2 groups. All patients were uniformly premedicated, 10 mins before induction. Group A received Inj Dexmedetomidine 1mcg/kg and Group B received Inj Dexmedetomidine 0.6mcg/kg iv. After induction with Thiopentone and succinylcholine, laryngoscopy and intubation was done. HR, SBP, DBP were recorded for both groups before premedication, 10min after premedication and 1min, 2min, 3min, 5min, 7min,10min after intubation. Data was analyzed and compared with paired t test. **Results:** HR and BP levels were lower at 10min after premedication and 5min after intubation than baseline levels in both groups. But in Dexmedetomidine 1mcg/kg group amount of increase in HR, SBP, DBP were lower compared to 0.6 mcg/kg. **Conclusion:** Dexmedetomidine 1mcg/kg is more effective than 0.6 mcg/kg in attenuating pressor response to laryngoscopy and intubation and provides more stable hemodynamic profile.

Keywords: Dexmedetomidine.

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INTRODUCTION

The hemodynamic pressor responses to laryngeal and tracheal stimulation following laryngoscopy and tracheal intubation were described by Reid and Brace in 1940[1] and King *et al* in 1951. To date exact mechanism of hemodynamic responses to laryngoscopy and intubation have not been clarified but have been associated with both sympathetic[2,3,4] and parasympathetic response[5]. These may include hypertension, Tachycardia due to increased plasma catecholamine concentrations[4]. It is usually well tolerated by healthy individuals, but even short lasting stimulation may be fatal in patient with hypertension, recent MI, preeclampsia, cerebrovascular diseases like tumor's, aneurysms or intracranial hypertension[2,5,6]. Various attenuating agents for this response have been used including opioids, barbiturates, benzodiazepines, beta blockers, calcium channel blockers, vasodilators etc.[7,8,9,10,11] Dexmedetomidine is the newer highly selective, specific and potent alpha 2 agonist having 8 times more affinity for alpha2 adrenoreceptors, shorter duration of action than clonidine and has an inhibitory effect on catecholamine release thereby decreaseing their plasma level[12,13,14,15]. Dexmedetomidine has additional effects such as anxiolysis, sedation, analgesia and improved hemodynamic stability. Various studies have also documented that different doses of Dexmedetomidine can decrease the hemodynamic response to laryngoscopy and

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intubation[15,16,17,18,19,20,21,22]. So that we decided to compare the two different doses of Dexmedetomidine - 1mcg/kg iv and 0.6mcg/kg iv to control hemodynamic responses due to laryngoscopy and intubation.

MATERIALS AND METHODS

After approval from ethical committee, the randomized prospective double blind study was carried out in tertiary referral medical college from December 2013.

Inclusion Criteria

- 60 patients belonging to
- Age group – 18 to 50 years
- ASA grade I and II
- Mallampatti grade I
- Elective surgical procedures under GA

Exclusion Criteria

- Patient refusal
- ASA grade III and IV
- Severely Hypovolemic
- Difficult airway
- History of cardiac disease and neurological disease
- Patients were subjected to routine investigations like CBC, BSL, Renal and Liver function tests. Written informed valid consent was taken from patient. Patients were premedicated with inj glycopylorate 0.004mg/kg i.m, ondansetron 0.15mg/kg iv, Inj midazolam 0.03 mg/kg iv half an hour before induction
- Patients were randomly divided in two groups

Group A: Dexmedetomidine 1mcg/kg

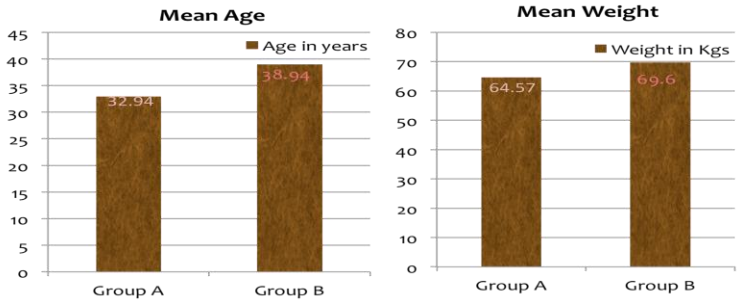
Group B: Dexmedetomidine 0.6mcg/kg

Injection Dexmedetomidine1mcg/kg diluted up to 10ml with NS and Injection Dexmedetomidine 0.6mcg/kg diluted upto 10ml with NS in groups A and B respectively were administered intravenously 10 minutes before laryngoscopy and intubation. Heart rate, Systolic blood pressure, diastolic blood pressure were recorded before premedication, after premedication, 1 min, 2 min, 5min, 7min and 10 min after intubation. Induction was done with Inj. Thiopentone 4-5 mg/kg and Inj. Succinylcholine 2mg/kg followed by laryngoscopy and intubation. Patients were maintained on oxygen (50%). Nitrous oxide (50%), Sevoflurane, nondepolarising muscle relaxants. Analysis of data done.

RESULTS

Table 1: Demographic data

	Age	No of patients	Weight
Group A	32.94	30	64.57
Group B	38.94	30	69.6



☞ Mean age and weight of both study groups are comparable to each other.

Figure 1: Mean Age and Weight

Table 2: Changes in heart rate

	HR (min)	Base line	10 min after pre med.	1 min after ETI	2 min after ETI	3 min after ETI	5 min after ETI	7 min after ETI	10 min after ETI
Group A	Mean	84.4	67.47*	80*	80.87*	79.8*	75.34*	73.6*	70.14*
	±SD	8.76	6.20*	10.45*	8.80*	7.31*	5.59*	6.07*	7.43*
Group B	Mean	81.47	78.8*	90.94*	94.6*	93.74*	90.54*	88*	85.34*
	±SD	7.14	7.49*	6.64*	6.72*	7.44*	7.97*	8.36*	7.34*

*Highly Significant

HR increased in both groups immediately after endotracheal intubation. But rise in HR 2min after endotracheal intubation is more in Group B compared to group A.

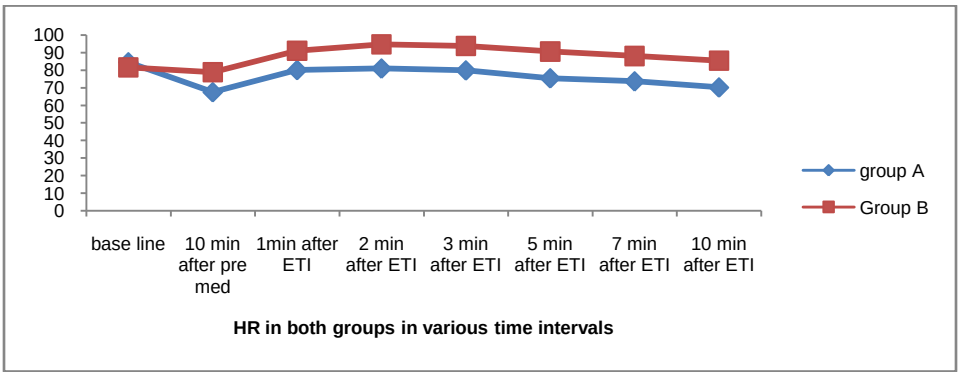


Figure 2: The increase was highly significant in Group B as compared to Group A during laryngoscopy and intubation

Table 3: Changes in systolic blood pressure

	SBP (mmgh)	Base line	10 min after pre med.	1 min after ETI	2 min after ETI	3 min after ETI	5 min after ETI	7 min after ETI	10 min after ETI
Group A	Mean	132.4	112.47*	126.8*	127.5*	124.53*	120*	113.2*	107.2*
	±SD	6.22	8.47*	8.97*	11.17*	12.40*	10.74*	10.8*	9.87*
Group B	Mean	132.27	126.47*	130.2*	145.14*	139.47*	132.2*	126.2*	119.5*
	±SD	6.84	7.34*	6.26*	5.26*	3.89*	4.29*	4.14*	5.59*

*Highly Significant

SBP increased in both groups immediately after endotracheal intubation. But rise in SBP 2min after endotracheal intubation is more in Group B than Group A.

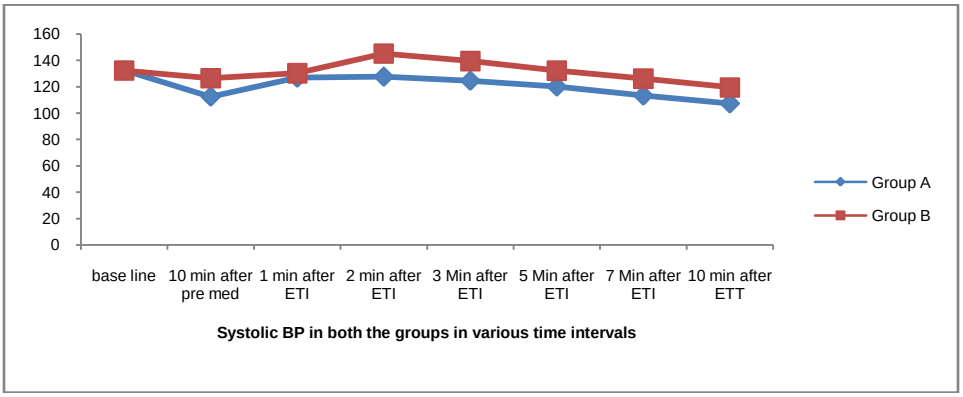


Figure 3: The increase was highly significant in Group B as compared to Group A during laryngoscopy and intubation

Table 4: Changes in dystolic blood pressure

	DBP (mmgh)	Base line	10 min after pre med.	1 min after ETI	2 min after ETI	3 min after ETI	5 min after ETI	7 min after ETI	10 min after ETI
Group A	Mean	81.87	69*	79.8	77.86	74.67*	71.27*	68.67*	66.2*
	±SD	6.19	5.38*	10.03	11.64	11.10*	9.38*	5.38*	5.48*
Group B	Mean	82.33	73.40*	76.07	81.07	79.47*	76.33*	73.73*	71.73*
	±SD	3.36	7.44	6.07	5.54	3.93*	3.14*	3.55*	3.31*

*Highly Significant

DBP increased in both groups immediately after endotracheal intubation. But rise in DBP 3 min after endotracheal intubation is more in Group B than Group A.

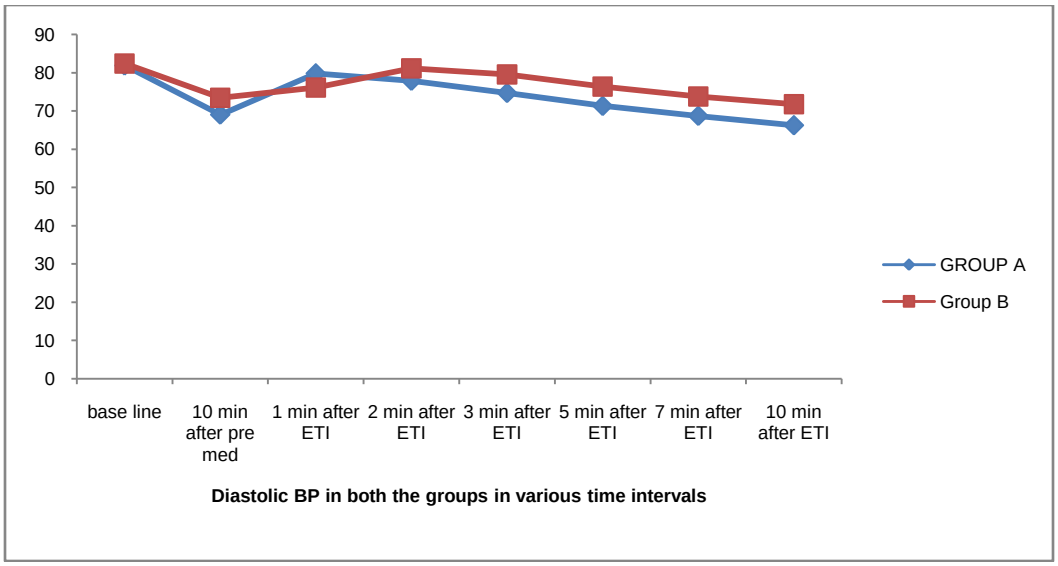


Figure 4: The increase was highly significant in Group B compared to Group A during laryngoscopy and intbation

DISCUSSION

Laryngoscopy and endotracheal intubation results in transient, but marked sympathetic and sympathoadrenal response. In patients with hypertension, Ischemic Heart Disease, cerebrovascular disease and intracranial aneurysms it can result in harmful consequences like left ventricular failure, pulmonary edema, myocardial infarction, ventricular dysarrhythmias and cerebral hemorrhage. It is for these reasons various studies had been carried out to search effective drug to attenuate this Hemodynamic response. Role of Dexmedetomidine as an analgesic, sedative, anxiolytic, sympatholytic and blunting agent for increased hemodynamic responses is being extensively studied. These responses are mediated by activation of alpha 2 receptors which are involved in regulating autonomic and cardiovascular systems. Alpha 2 receptors are located on blood vessels mediate vasoconstriction and on sympathetic terminals inhibit release of catecholamines. Alpha 2 receptors are also located within the postsynaptic terminals in central nervous system, their activation result in sedation, decreased neuronal activity and augmentation of vagal activity.[12,23,24,25,26,27,28] Our study was conducted to compare the efficacy of i.v. Dexmedetomidine 1mcg/kg with Dexmedetomidine 0.6mcg/kg to attenuate pressor response to laryngoscopy and intubation. Our study was carried out in 60 patients of ASA grade 1 and 2 who were divided in 2 groups of 30 each. The group A was given inj Dexmedetomidine 1mcg/kg and group B was given inj Dexmedetomidine 0.6 mcg/kg 10 minutes before laryngoscopy and intubation. Hemodynamic parameters like heart rate, systolic blood pressure, diastolic blood pressure were measured at different time intervals in each patient. We found that both groups of Dexmedetomidine showed attenuated pressor response to Laryngoscopy and endotracheal intubation. Different studies with different doses of Dexmedetomidine like 0.5 mcg/kg, 0.6mcg/kg, 0.75mcg/kg, 1 mcg/kg have been done to attenuate pressor response to intubation. So we decided to evaluate and compare efficacy of two different doses of Dexmedetomidine i.e. 1mcg/kg and 0.6mcg/kg. It was found in the study by Scheinin's *et al* that Dexmedetomidine 0.6mcg/kg attenuated hemodynamic response to intubation and required dose of thiopentone is significantly lower[16]. Jaakola *et al* concluded that, during the intubation blood pressure and heart rate is significantly reduced by 0.6 μg. kg^{-1} dexmedetomidine[17]. Yildiz *et al* found that a single dose of 1mcg/kg dexmedetomidine prevented cardiovascular hemodynamic response and decreased need for additional opioid during laryngoscopy and endotracheal intubation in elective minor surgery patients[15]. Ozkose *et al.* administered a single dose of 1mcg/kg Dexmedetomidine 10 min before induction. They reported that with control measurements, mean arterial pressures decreased up to 20% and heart rate is decreased up to 15% 1min and 3 min following intubation[31]. In the other study which was done by Tezer *et al*. it is concluded that sympathetic responses during laryngoscopy and intubation were effectively reduced by dexmedetomidine 1 $\mu g.kg^{-1}h^{-1}$ and esmolol 250 μg/kg/min[32]. Khan *et al*. demonstrated that heart rate, systolic and diastolic blood pressure were reduced by dexmedetomidine[33]. In another study on the patients undergoing vascular surgery, it was observed that in the recovery period dexmedetomidine infusion led to supression on heart rate and plasma cathecholamine levels[34]. Jaaokola *et al*[17], R saraf *et al*[30], B. scheinin *et al*[16], Tezer *et al* concluded in their study that

Dexmedetomidine 0.6 mcg/kg significantly reduced blood pressure and Heart rate during intubation. On the other hand, Yildiz *et al*[15], Ozkose *et al*[31], Aho *et al*[18] Sukhminderjit singh Bajwa *et al*[29] in their studies concluded that sympathetic response during intubation effectively reduced by Dexmedetomidine 1mcg/kg which is comparable to our study. In this study in both groups, Heart rate, Systolic blood pressure, Diastolic blood pressure started decreasing up to 10min after premedication with study drug in respective group. These observations are comparable to those by Sukhminderjit singh Bajwa *et al*[29], B. scheinin *et al*[16]. We observed decrease of HR, SBP, DBP in Dexmedetomidine 1mcg/kg group is more than Dexmedetomidine 0.6 mcg/kg. In both groups HR, SBP, DBP increased after laryngoscopy and intubation. The peak increase in HR, SBP, DBP was seen at 1min after intubation. However increase in HR, SBP, DBP is less in group Dexmedetomidine 1mcg/kg as compared to Dexmedetomidine 0.6 mcg/kg. This increase was highly significant. No adverse cardiovascular effects from drug were seen in the present study. Bradycardia (HR<50/min), a possible consequence of administration of alpha 2 agonist, was counteracted by Atropine 0.6mg iv. Also no adverse effects like nausea, vomiting, respiratory depression, apnea, muscle rigidity were seen.

CONCLUSION

Both Dexmedetomidine 1mcg/kg and 0.6 mcg/kg attenuate pressor response to laryngoscopy and endotracheal intubation. But Dexmedetomidine at dose of 1mcg/kg is more effective than 0.6 mcg/kg in attenuating pressor response and provides more stable hemodynamic profile.

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