ORIGINAL RESEARCH PAPER

Volume-9 | Issue-2 | February-2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARATIVE EVALUATION OF DEXMEDETOMIDINE AND ESMOLOL FOR ATTENUATION OF HEMODYNAMIC RESPONSE TO LARYNGOSCOPY AND INTUBATION IN ADULT PATIENTS UNDERGOING ELECTIVE GENERAL SURGERY: A PROSPECTIVE, RANDOMIZED DOUBLE-BLINDED STUDY

Anesthesiology

Dr Anjali Dixit* Assistant Professor, Department Of Anaesthesia, G. S. Medical College , UP *Corresponding Author

Dr Mahesh Tiwari Assistant Professor, Department Of General Surgery, G. S. Medical College ,UP

ABSTRACT

Aim: The aim of this study is to compare the clinical effects of dexmedetomidine versus esmolol in attenuating the hemodynamic response during laryngoscopy and intubation.

Subject and Method: It is a randomized, prospective, double-blind study. We studied 90 adults, American Society of Anesthesiologists physical status I and II patients of either sex, scheduled for surgery under general anaesthesia. The patients were randomly divided into two groups .Group E received 1.0 mg/kg of esmolol and Group D received 0.5 µg/kg of dexmedetomidine. Heartrate (HR), Systolic and Diastolic blood pressures(SBP,DBP) were recorded at baseline, before intubation and after intubation at 1,3,5,10 min.

Result: The HR, SBP and DBP was significantly decreased in group D after laryngoscopy and intubation as compared to Group E.

Conclusion: Dexmedetomidine provides a consistent and effective attenuation of hemodynamic responses as compared to esmolol.

KEYWORDS

Dexmedetomidine, esmolol, hemodynamic response, laryngoscopy

INTRODUCTION

Laryngoscopy and endotracheal intubation lead to strong sympathetic response which manifests as transient but marked tachycardia and hypertension.[1]The response may be tolerated by healthy individuals but may precipitate arrhythmias, myocardial ischemia, and cerebrovascular accidents in patients with preexisting cardiovascular disease. Different methods have been used to suppress these responses such as use of topical lignocaine spray, maintenance of deep Plane of anesthesia by intravenous (IV) opioids, calciumchannel blockers, and vasodilators, but none of one was perfect so the search for a perfect agent is continuing.

Esmolol is a rapid onset, ultrashort acting selective β-1 adrenergic receptor antagonist and proved to be an efficient agent to provide hemodynamic stability during laryngoscopy and intubation. Dexmedetomidine is a selective α-2 agonist which produces hyperpolarization of noradrenergic neurons and suppresses neuronal firing in the locus ceruleus, which decreases sympathoadrenal response and maintains hemodynamic stability during laryngoscopy and intubation.[2,3]

The primary outcome observed in the study was to compare the efficacy of dexmedetomidine and esmolol to suppress hemodynamic response during laryngoscopy and intubation. The side effects of either drug were studied as the secondary outcome.

MATERIALS AND METHODS

After clearance from Ethical Committee of the institute, the study was conducted at Department of Anaesthesiology, G.S. Medical College, UP.

After written and informed consent 90 ASA class I & II adults (20 -50 years) posted for surgery under general anaesthesia, were included and patients with Mallampati grade III &IV, with any other comorbidities (COPD, IHD, HTN, DM,Renal/ Hepatic dysfunction), morbid obesity, pregnancy, could not be intubated within 15 sec of laryngoscopy and who did not give consent were excluded.

A night before surgery the patients were visited for pre-anaesthetic review and standard institutional preoperative advice was given.

In the operating room, an 18G IV cannula was secured and infusion of Ringer lactate was started at 10 mL/kg/h.Standard monitoring including pulse oximetry, ECG,and noninvasive blood pressure was attached and baseline vitals such as HR,SBP&DBP were recorded. All patients received premedication with IV midazolam 0.03 mg/kg and IVfentanyl 1 µg/kg. The patients were randomly allocated to two groups of 45 patients each. Randomization was performed by computer generated random numbers. This was done by an anesthesiologist who was unaware of the study protocol and was not involved in administering the drugs or observing results. The patients were blinded to the treatment group and all recordings were performed by a separate anesthesiologist blinded to the group allocation.

Group E : The patients received Inj. esmolol (1.0mg/kg) 2 min before intubation.

Group D: The patients received Inj. Dexmedetomidine(0.50 mcg /kg) in 10 ml normal saline over 10 min prior to intubation.

After giving the study drug,all patients were preoxygenated with 100% oxygen for 3 min and general anesthesia was induced with IVpropofol 2.0 mg/kg. After loss of response to verbal commands,IV succinylcholine 2mg/kg was given as per standard protocol. Laryngoscopy and intubation was done by an anesthesiologist ,after confirming bilateral equal air entry by auscultation, tube was secured and the patients were put on controlled ventilation.All patients received IVvecuronium 0.08 mg/kg for muscle relaxation and maintained on intermittent bolus doses of vecuronium 0.02 mg/kg as per requirement along with O2 ,NO2and isoflurane 1%–1.5%.During the study period of 10 min following intubation, no stimulus such as any surgical intervention, nasogastric tube insertion, surgical incision, or any drug administration was given.Vital parameters including HR,SBP and DBP were recorded at 1,3,5 and 10 min after intubation. Patients were observed for any episode of bradycardia (HR <50 beats/min),hypotension (SBP <20% baseline), and any other adverse events during the surgery.After completion of surgery, residual neuromuscular blockade was reversed with IV neostigmine 0.05 mg/kg and IV glycopyrrolate 0.01 mg/kg. Patients were extubated after complete clinical recovery and were shifted to postanesthesia care unit.

STATISTICALANALYSIS

Mean and Standard deviation for all values were calculated and compared within group, with baseline values as well as intergroup comparison were done. Paired and unpaired t-test and chi-square test were used for statistical analysis. P-value < 0.005 was considered statistically significant. P-value < 0.001 was considered statistically highly significant. The data was analysed with the help of computer software MS Excel and SPSS 19.

RESULT AND DISCUSSION

Ninety (45 in each group) patients were randomized during the study.There was no significant difference in demographic characteristics such as age,weight and sex. Both groups were comparable. Mean HR at baseline was 84.11 beats/min in group E which was comparable to 86.5 beats/min in group D and difference was not statistically significant. Same trend observed at end of induction in both groups. After that the HR at 1,3,5 and10min after intubation was significantly lesser in group D as compared to E group and difference was statistically significant (*Table 1*).The mean SBP at

baseline was 123 mmHg in group E which was comparable with 125.2 mmHg in group D and difference was not statistically significant. Same trend was observed just before intubation. After that SBP at 1,3,5 and 10 min after intubation was significantly lesser in group D as compared to the E group and difference was statistically significant (*Table2*). The mean DBP at baseline was 82.66 mmHg in group E which was comparable with84.2mmHg in group D and the difference was not statistically significant. Same trend was observed at the end of induction/ just before intubation. At 1 and 3 min after intubation DBP was significantly lesser in group D as compared to groupE and difference was statistically significant. However mean DBP at 5and10 min after intubation was comparable between group E and group D and the difference was statistically insignificant (*Table 3*). No patients in either group required treatment for bradycardia and hypotension. No other adverse effects were noted in any patient.

Table 1. Comparison of HR (beats/min) Between Groups

HR	Group E	Group D	P value
Baseline HR	84.11±2.9 3	86.5±4 .78	0.66
HR just before intubation	79.66±2.9 7	79.13± 2.66	0.53
HR at 1min after intubation	96.93±4.4 4	81.33±3.33	<0.00 01
HR at 3min after Intubation	95.86±3.9 9	79.33±3.37	<0.0001
HR at 5min after Intubation	90.66±4.0 0	76.13±3.14	<0.0001
HR at 10 min after intubation	90.53±3.5 3	74.73±2.94	<0.0001

Table 2. Comparison of SBP between groups

SBP	Group E	Group D	P value
SBP at Baseline	123 ± 1.2	125.2 ± 0.96	0.26
SBP just before intubation	133.11 ± 6.4	133.8 ± 0.76	0.85
SBP at 1min after Intubation	165.80 ± 9.53	128 ±7.33	< 0.0001
SBP at 3min after intubation	156.80 ± 9.09	124 ± 6.33	<0.0001
SBP at 5min after intubation	143.80 ± 7.88	118 ± 4.48	<0.0001
SBP at 10 min after intubation	136.27 ± 5.29	110 ± 3.61	<0.0001

Table 3. Comparison of DBP (mmHg) between Groups

DBP	GroupD	GroupD	P value
DBP at Baseline	82.66 ± 0.91	84.2 ± 0.66	0.27
DBP just before intubation	78.66 ± 5.39	79.33 ± 5.66	0.64
DBP at 1min after Intubation	99.33 ± 6.65	80.06± 8.08	< 0.0001
DBP at 3min after Intubation	90.26 ±7	67 74 ±8.26	<0.0001
DBP at 5min after Intubation	74.66 ±5.68	71.86± 7.12	0.59
DBP at 10 min after intubation	71.60 ± 5.7	69.26± 6.203	0.12

Dexmedetomidine has sedative,anxiolytic, analgesic and sympatholytic, effects may blunt the cardiovascular responses in the peri-operative period without causing significant respiratory depression. Among the β-adrenergic blocking drugs, esmolol seems to be an appropriate selection for attenuating the hemodynamic response to laryngoscopy and tracheal intubation, because of its cardioselectivity, rapid onset of action and short elimination half-life.

In our study we found that dexmedetomidine was more effective than esmolol for controlling heart rate and blood pressure after laryngoscopy and intubation. Sulaiman *et al*.,studied the effects of dexmedetomidine on attenuation of stress response to intubation in patients undergoing elective off pump CABG,they concluded that pretreatment with dexmedetomidine (0.5µg/kg)as 10 min infusion prior to induction of anesthesia attenuate the hemodynamic response to laryngoscopy and intubation.[4] A biphasic cardiovascular response has been described after the administration of dexmedetomidine. A bolus of 1µg/kg results in a transient increase in arterial blood pressure and reflex decrease in HR in young healthy patients. Initial response is due to alpha 2 receptor stimulation of vascular smooth muscle. This response can be markedly decreased by slow infusion over 10 min[5]. In our study, this effect was not noticed due to the slow infusion of the drug over 10 min. Saraf *et al* ., also found that the dexmedetomidine (0.6µg/kg) given 10 minute before induction effectively attenuate the pressor response to laryngoscopy and intubation without any side effect.[6]We have used low dose of dexmedetomidine i.e 0.5µg/kg because higher dose i.e 1µg/kg was associated with increased incidence of hypotension and bradycardia[7]. Results of our study correlates with the study conducted by Reddy SV and coworkers, who found that dexmedetomidine (1µg/kg) was more effective than esmolol (2mg/kg) for suppressing the pressure response to laryngoscopy and intubation.[8] Similar results about dexmedetomidine and esmolol were observed by GuptaH B *et al.* [9]. Recently in a study, the effect of dexmedetomidine versus esmolol on attenuation of stress response to intubation in patients undergoingelective off pump CABG, it was observed that dexmedetomidine (0.5µg/kg) provides more sustained hemodynamic stability than esmolol (2mg/kg). [10].The limitation of the study was that we did not measure the plasma norephinephrine levels and study did not include placebo group.

CONCLUSION

Based on the results of our study we concluded that dexmedetomidine in dose of 0.5µg/kg i.v is more effective to attenuate the hemodynamic response to laryngoscopy and intubation than esmolol 1mg/kg i.v when given before laryngoscopy .Both drugs had no side effects in our study.

REFERENCES

1. Forbes AM, Dally FG. Acute hypertension during induction ofanaesthesia and endotracheal intubation in normotensive man. Br J Anaesth 1970;42:618-24.
2. Keniya VM, Ladi S, Naphade R. Dexmedetomidine attenuatessympathoadrenal response to tracheal intubation and reducesperioperative anaesthetic requirement. Indian J Anaesth 2011;55:352-7.
3. Bajwa SJ, Kaur J, Singh A, Parmar S, Singh G, Kulshrestha A, et al.Attenuation of pressor response and dose sparing of opioids andanaesthetics with pre-operative dexmedetomidine. Indian J Anaesth2012;56:123-8.
4. Sulaiman S, Kaarthekeyan RB, Vakamudi M, Sundar AS,Ravullapalli H, Gandham R. The effects of on attenuationof stress response to endotracheal intubation in patientsundergoing elective off-pump coronary artery bypassgrafting.Ann Card Anaesth 2012;15:39-43
5. Bloor BC, Ward DS, Belleville JP, Maze M. Haemodynamicchanges. Anaesthesiology 1992;77:1133-42.
6. Saraf, R. Dexmedetomidine ideal ideal drug for attenuatingthe pressor response. Pediatric Anaesthesia and CriticalCare Journal 2013;1(1):78-86.
7. Varshali M Keniya, Sushma Ladi, and Ramesh Naphade.Dexmedetomidine attenuates response to trachealintubation and reduces perioperative anaestheticrequirement. Indian J Anaesth. 2011 Jul-Aug;55(4):352-357.
8. Reddy SV, Balaji D, Ahmed SN. Dexmedetomidine vsesmolol to attenuate the haemodynamic response tolaryngoscopy and tracheal intubation: A randomized doubleblind clinical study. Int J Appl Basic Med Res.2014; 4(2):95-100.
9. Gupta HB, Byas S•A. A comparative study of efficacy ofintravenous dexmedetomidine and intravenous esmolol forattenuation of stress response during laryngoscopy and endotracheal intubation. Int J Basic Clin Pharmacal2016;5:1803-08.
10. Mudgalkar N. Reddy KR, Ramprasad LS. The effect ofdexmedetomidine versus esmolol on attenuation of stress response to intubation in patients undergoingelective off pump coronary artery bypass grafting.Perspective in Medical Research. 2016:4(1);23-26.