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A COMPARATIVE STUDY OF IV DEXMEDETOMIDINE AND IV LIGNOCAINE ON ATTENUATION OF AIRWAY AND PRESSOR RESPONSES DURING TRACHEAL EXTUBATION

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ABSTRACT **Introduction :** Extubation of trachea is almost always associated with the pressor response and airway response, which might be detrimental to some patients . All the efforts are made to reduce the pressor and airway responses. Dexmedetomidine , alpha 2 agonist has the property of sympatholysis , sedation, anxiolysis. Ligocaine, loacal anesthetic with myocardial depressant effect ,central stimulant effect ,peripheral vasodilatory effect are used to supress airway and pressor response .In our study we have compared IV Dexmedetomidine and IV Lignocaine in attenuation of pressor and airway response. **Method:** 90 patients of ASA grade I and II of age 18 to 65 years of either sex undergoing general anesthesia are studied . After surgery all inhalational anesthetics were discontinued , on return of spontaneous efforts study drugs were administered over 60 seconds .Values of HR ,SBP ,DBP and MAP noted from the time of drug administration to 10 min post extubation at different time intervals . Quality of extubation assessed with a 5 point scale. **Results:** Both Dexmedetomidine and lignocaine attenuated pressor response but Dexmedetomidine was found to be better in attenuating pressor response when compared to lignocaine. Most patients of dexmedetomidine group (83.3%) had a extubation quality score of 1 , whereas in lignocaine group 66.6 % had score 1. **Conclusion:** Both Dexmedetomidine and Lignocaine reduces airway and pressor responses but Dexmedetomidine is better than lignocaine .

KEYWORDS : Extubation, Pressor response , airway response ,Dexmedetomidine, Lignocaine

INTRODUCTION:

Extubation is one of the most uncomfortable state during general anesthesia . Transient but significant undesirable hemodynamic effect such as hypertension and tachycardia persisting in to recovery period may be caused by tracheal extubation[5,6] . Stimulation of respiratory tract at supraglottic and subglottic levels and an increase in the circulatory catecholamines produces these responses .Most patients tolerate these effects without any significant consequences , but some show an exaggerated response which is poorly tolerated and may lead to Myocardial ischemia, cardiac decompensation ,pulmonary edema or cerebral haemorrhage . Different drugs like opiod [30],lignocaine [24],Dexmedetomidine [11,1] , Beta blockers [4,18] , propofol [19], magnesium sulphate [14] , verapamil [15] , ,etc in different doses either alone or in different combinations have been used to attenuate the hemodynamic response and airway response during tracheal extubation. Respiratory complication during tracheal extubation are cough, sore throat ,laryngospasm and bronchospasm which leads to hypoxemia .Laryngospasm is the most common cause for post extubation upper airway obstruction .

Dexmedetomidine is a new α 2 agonist with eight times more affinity for α 2 adrenoreceptors compared to clonidine, which has shown only partial agonist activity and is known to decrease the plasma catecholamines level and suppress the release of catecholamines.The net effect of dexmedetomidine action is a significant reduction in circulating catecholamines , with a slight decrease in blood pressure and a modest reduction in heart rate .

Lidocaine attenuates the hemodynamic response to tracheal extubation by its direct myocardial depressant effect, central stimulant effect, peripheral vasodilatory effect and finally it suppresses the cough reflex, an effect on synaptic transmission.

Therefore, the present placebo controlled double blind study was designed to study the efficacy of Dexmedetomidine IV and lignocaine IV in attenuating the airway and pressor responses during tracheal extubation in patients belonging to ASA I and II of age 18 to 65 years undergoing General anesthesia for elective surgery.

MATERIALS AND METHODS :

After obtaining institutional ethical approval from instituitional ethical committee , B J Medical college and Civil Hospital ,Ahmedabad . 90 patients of ASA grade I and II of age 18 to 65 years of either sex undergoing general anesthesia for elective surgery are studied.Patients with Heart rate less than 60 , BP < 100/60 mm of Hg , History of Ischemia and congestive cardiac disease ,renal ,hepatic and respiratory dysfunction ,patients on beta blockers , digoxin, alpha 2 agonist ,anticonvulsant or psychotropic medications , patients allergic to study drugs were excluded from the study .

Patients were randomly divided in to 3 groups, 30 patients in each group. Group A-Patients receiving Dexmedetomidine 0.5mcg/kg (Diluted to 10 ml with NS) Group B-Patients receiving lignocaine 1.0mg/kg (diluted to 10 ml with NS) Group C-Patients receiving Normal saline 10 ml.

Preoperative evaluation was carried out a day before the surgery. Pre induction HR, SBP, DBP, MAP, SpO2 were Recorded. All patients were pre medicated with Inj. Glycopyrrolate 0.04mg/kg IV , Inj.Fentanyl 2mcg/kg IV. Induction of anesthesia was carried out using Inj.Propofol 1.5-2.5mg/kg IV, followed by Inj.Suxamethonium 2mg/kg IV to facilitate Intubation and airway secured with appropriate sized, portex cuffed endotracheal tube. Maintainence of anesthesia was carried out with 50% Oxygen +50 % Nitrous oxide, sevoflurane 1-1.5%. Atracurium 0.5mg/kg given as loading dose and 0.1mg/kg as maintenance dose. Hemodynamic parameters were monitored intra operatively , After surgery Inhalational anesthetic agents were discontinued, baseline values for HR, SBP, DBP and MAP were noted. On return of Spontaneous efforts, study drugs were administered over 60 seconds. Residual paralysis reversed with Inj.Glycopyrrolate 0.08mg/kg and Inj.Neostigmine 0.05mg /kg. Values of HR, SBP, DBP and MAP noted every minute till extubation, immediately after extubation and at 1min ,2 min, 3 min ,5 min and 10 min post extubation. Emergence time, Extubation time, Quality of extubation, Ramsay Sedation scale, duration of anesthesia were noted.

Emergence time is a time interval between discontinuing of anaesthetic agents and patient following verbal commands.

Extubation time is the time interval between cessation of anaesthtics and tracheal extubation.

The Quality of extubation was assessed with a 5 point scale

1-No cough /minimal cough smooth extubation.
2-smooth extubation, slight cough 1-2 times.
3-Moderate coughing 3-4 times
4-severe coughing 5 -10 times and difficult breathing
5-poor extubation, laryngospasm, cough >10 times

Ramsay sedation scale Score Definition

1 Anxious and agitated or restless or both
2 Cooperative, oriented and tranquil
3 Responds to command only
4 Brisk response to light glabellar tap or loud auditory stimulus
5 Sluggish response to light glabellar tap or loud auditory stimulus
6 No response to light glabellar tap or loud auditory stimulus

Statistical Analysis

Quantitative data was analyzed using t-test and qualitative by chi square test. Statistical calculations were carried out using Microsoft Office Excel 2010 and Graph Pad Prism 6.05 (quickcalc) Software (Graph pad software inc. La Jalla CA USA). Changes in hemodynamic variables from baseline and a comparison of means were analyzed by paired t-test for each time interval. A p-value >0.05 was considered non-significant.

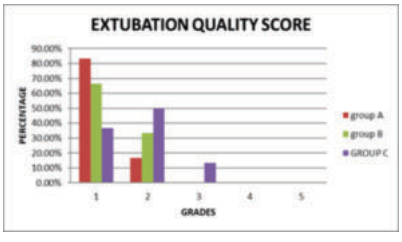
RESULTS

All three groups were comparable with respect to Age , Gender , weight and ASA grading .

The values of HR at pre induction and before drug administration were statistically not significant between all three groups ($p>0.05$). At 2 min and 3 min after drug administration , Heart rate is statistically significant in between AB and AC but not significant between BC though the mean heart rate of Group B is less than Group c at 4 minutes after drug administration ($p < 0.05$).There was significant difference in HR from 4 min after drug administration till 10 minute after extubation between group AB ,Group AC and Group BC.

The values of systolic blood pressure at pre induction, before drug administration and At 1 minute post drug administration were statistically not significant between all three groups ($p>0.05$). At 2 min after drug administration, reduction in SBP is statistically significant in between AC and BC but not significant between AB though the mean SBP of Group A is less than Group B. At 3 min, 4 min, 5 minutes after drug administration and till 10 mins post extubation, There was significant difference in reduction of SBP between Group AB, Group AC and Group BC. From 3 mins after drug administration to 10 min post extubation reduction in DBP is statistically significant between groups AB, AC and BC.. The values of mean arterial pressure at pre induction, before drug administration, At 1 min, 2 min post drug administration reduction in MAP were statistically not significant between all three groups ($p>0.05$). From 3 min after drug administration to 10 mins post extubation reduction in MAP is statistically significant between group AB, AC, BC.

Graph 1: Extubation Quality score



Quality of extubation in 83.3% ,66.6 % ,36.6% patients of Group A, B and C respectively had a extubation quality score of Grade 1. 16.6% ,33.3%,50 % patients of Group A, B and C respectively had a extubation quality score of Grade 2. 13.3% patients of group C had a extubation quality score of grade 3. None of the patients of group A and B had Grade 3 score.

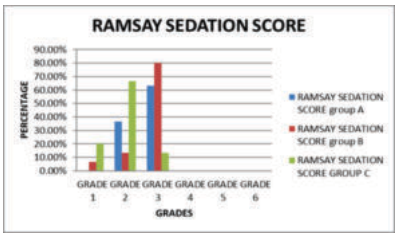
In Group A- 6.6 % of patients were anxious, restless, 13.3 % patients were cooperative and oriented and 80 % of the patients were responding to command.

Group B -36.6 % of patients were cooperative, oriented and tranquil .and 63.3% of patients were Responsding to command only.

In Group C- 20 % of the patients were anxious ,66.6 % patients were cooperative and oriented, 13.3% patients were responding to command.

with respect to duration of surgery, duration of anesthesia , Emergence time, Extubation time and Modified aldrete score all the Groups were comparable to each other

Graph 2: Ramsay sedation score



Discussion

Cardiovascular response to laryngoscopy and endotracheal extubation has always been a challenge for anesthetists. Cardiovascular response may occur in form of hypertension, tachycardia, high plasma level of catecholamines and different types of arrhythmias. These effects may prove disastrous in patients of hypertension, myocardial insufficiency, eclampsia, cerebral hemorrhage etc. Tracheal extubation is associated with 10-30% increase in arterial pressure and HR lasting 5 -15min [17] .

Respiratory complications after tracheal extubation are 3 times more common than complications occurring during tracheal intubation and induction of anaesthesia (4.6% vs. 12.6%) [3]. Several drugs like Beta blockers, calcium channel blockers, opioids, Alpha 2 agonists, Sodium channel blockers, etc have been tried alone or in combination and in different doses to attenuate hemodynamic response and airway response. So, in our study, we have compared the effect of Dexmedetomidine and Lignocaine on hemodynamic stress responses and airway response during tracheal extubation.

Dexmedetomidine is a selective α 2 adrenegic agonist . α 2: α1 selectivity of dexmedetomidine is 1620:1 . Dexmedetomidine enhance anesthesia produced by other anesthetic drugs, causes perioperative sympatholysis and decrease blood pressure by stimulating central alpha2 and imidazoline receptors. Alpha 2 receptors are found in central ,peripheral and autonomic nervous system ,as well as vital organs and blood vessels.

Lignocaine attenuates hemodynamic response to tracheal extubation by its direct myocardial depressant effect ,central stimulant effect , and peripheral vasodilotory effect. Due to action on synaptic transmission there is attenuation of cough reflex.[24]

Airway response is assessed using Extubation quality score ,Ramsay sedation score is used to assess for sedation post drug administration .

CONCLUSION

To conclude the Study we have observed that though both Dexmedetomidine and lignocaine reduces aiway and pressor response but Dexmedetomidine is found to be better than lignocaine in attenuating airway and pressor response during tracheal extubation. without affecting Emergence time, Extubation time.

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