ORIGINAL RESEARCH PAPER

Medical Science

"ATTENUATION OF HEMODYNAMIC RESPONSE TO TRACHEAL INTUBATION WITH INTRAVENOUS DEXMEDETOMIDINE IN PATIENTS UNDERGOING LAPROSCOPIC CHOLECYSTECTOMY"-A COMPARISON BETWEEN TWO DOSES.

KEY WORDS: dexmedetomidine, laproscopic cholecystectomy, hemodynamic response, general anesthesia, laryngoscopy.

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ABSTRACT

INTRODUCTION: Laryngoscopy and intubation are noxious stimuli associated with responses of laryngosympathetic stimulation like hypertension, tachycardia and arrhythmias. Drug like dexmedetomidine have the potential to blunt the hemodynamic responses to laryngoscopy and intubation. Dexmedetomidine is a highly selective short acting alpha -2 adrenoreceptor agonist. It decreases the hemodynamic response to laryngoscopy and intubation. It provides sedation, analgesia and anxiolysis with minimal respiratory depression.

AIM: In this study we compared two IV doses of dexmedetomidine 0.5ug/kg and 0.75 ug/kg in attenuating stress response during laryngoscopy and intubation in patients undergoing laproscopic cholecystectomy. The study also compared the sedation score with two different IV doses of dexmedetomidine.

MATERIAL AND METHOD: 45 ASA I –II patients in the age range of 18-50 years of either sex scheduled for laproscopic cholecystectomy were randomly allocated into 3 groups of 15 patients each. Group 1 received 20 ml of Normal Saline slowly over 10 min prior to induction of anesthesia. Group 2 received IV dexmedetomidine 0.5ug/kg in 20ml of Normal Saline slowly over 10 min prior to induction of anesthesia. Group 3 received IV dexmedetomidine 0.75ug/kg in 20ml of Normal Saline slowly over 10 min prior to induction of anesthesia.

RESULTS: There was a statistically significant difference between dexmedetomidine and normal saline group in heart rate, systolic BP and diastolic BP after laryngoscopy and intubation with dexmedetomidine 0.75ug/kg being most effective. Sedation scores were more in dexmedetomidine groups. None of the patients had any adverse effects like bradycardia, hypotension and respiratory depression or desaturation.

CONCLUSION: We concluded that IV dexmedetomidine 0.75ug/kg is the optimal dose and significantly superior to IV dexmedetomidine 0.5ug/kg in attenuating the hemodynamic response to laryngoscopy and intubation

INTRODUCTION

Endotracheal intubation is the translaryngeal placement of a tube into the trachea via nose or mouth of the patient. This process is associated with intense sympathetic activity marked by tachycardia and hypertension. Normal healthy patients tolerate this response, but in susceptible individuals this transient sympathetic response can evoke life threatening conditions like myocardial infarction, ventricular dysrhythmias ,ventricular failure and cerebrovascular accidents. The hemodynamic changes brought about by laryngoscopy and intubation were first described by Reid and Brace[1].The response is initiated within 5sec of laryngoscopy, peaks in 1-2min and returns to normal levels by 5 mins. Various drug regimens such as opoids, lignocaine, nitroglycerine, calcium channel blockers and beta- blockers eg. esmolol have been tried to obtund the hemodynamic stress response. Alpha 2 agonists like clonidine and dexmedetomidine have been used for attenuation of the stress response to laryngoscopy and intubation.IV dexmedetomidine in a dose of 0.5ug/kg ang 1ug/kg have been found to be effective. But the higher dose of 1 ug/kg was associated with adverse effects of hypotension, bradycardia and increased sedation. There are only a few studies till date available with dexmedetomidine 0.75ug/kg in the literature. Hence, this study was undertaken to arrive at an optimal dose of dexmedetomidine for attenuation of hemodynamic stress response to laryngoscopy and intubation.

MATERIAL AND METHOD

After obtaining approval from the institutional ethics committee and written informed consent ,45 ASA I-II patients of either sex scheduled for laproscopic cholecystectomy were selected. Patients with anticipated difficult airways, known allergy or hypersensitivity to dexmedetomidine, previous history of heart disease, a heart rate of less than 45 bpm, emotional instability, a second or third degree atrioventicular block, patients on antihypertensive drugs like clonidine, patients on long-term sedatives and morbidly obese patients were excluded from the study. On the day prior to surgery a thorough general physical examination and systemic examination was performed. Routine investigations were done. Premedication in the form of tab ranitidine 150mg and tab alprazolam 0.5 mg was given on the previous night of surgery. Patients were kept NPO according to the guidelines. Patients were randomly divided into three groups of 15 each. The double blinding procedure was followed in which the person administering the drug and the patients both were unaware to which group the patient belonged to.

All patients were connected to multichannel monitors for recording ECG, pulse oximetry and non- invasive blood pressure. An IV line was secured and connected to IV fluid RINGER LACTATE .Base line heart rate ,systolic BP,diastolic BP and oxygen saturation SpO2 were measured. Study drug infusion was given over 10 min. Group 1 received 20 ml of Normal Saline slowly over 10 min prior to induction of anesthesia. Group 2 received IV dexmedetomidine 0.5ug/kg in 20ml of Normal Saline slowly over 10 min prior to induction of anesthesia. Group 3 received IV dexmedetomidine 0.75ug/kg in 20ml of Normal Saline slowly over 10 min prior to induction of anesthesia.Any hypotension SBP fall >20% from baseline was treated with increments of IV ephedrine 3mg.Bradycardia HR<50 was treated with IV atropine 0.6mg.After completion of drug infusion ,sedation was assessed at 2,5,10 min using RAMSAY SEDATION SCORE[2]..After noting sedation scores and monitoring hemodynamics for 10 min, the anaesthetic procedure was initiated.All patients were preoxygenated for 3 min.Then , patients were induced with IV propofol 1.5 mg /kg ,IV fentanyl 1ug/kg and IV succinylcholine 2mg/kg.Following laryngoscopy and intubation ,the parameters HR,SBP,DBP were recorded at 1,3 and 5 min.after intubation.Anesthesia was maintained with O2 :N2O in the ratio of 50% each and isoflurane of 0.4 to 0.8 %.Muscle relaxation was maintained with Vecuronium 0.1mg/kg with top ups of 0.04mg/kg. After surgery, reversal was achieved with IV neostigmine 0.05mg/kg and iv glucopyrrolate 0.01mg/kg.After adequate recovery, patients were shifted to post anesthesia care unit for observation.

RESULTS

The mean age, gender and weight distribution in all the groups were statistically insignificant.

PARAMETERS	GROUP1(n=15)	GROUP2(n=15)	GROUP3(n=15)
AGE (yrs ±SD)	33.50±8.12	35.96±9.33	30.20±9.33
GENDER M	7	5	6

F	8	10	9
WEIGHT(Kg)	63.5±12.02	64.5±10.57	62.5±12.36
ASA I II	 10 5	 9 6	 8 7

The baseline reading of HR, SB and DBP were similar in all the three groups. Maximum intubation response was seen at 1 min post intubation in all the three groups .In group 1 ,the hemodynamic variables did not reach the baseline by 5 min.In group 2 , the hemodynamic variables .approached near baseline by 3 min . In group 3,the variables fell below the baseline by 3 min . Hence it can be inferred that hemodynamic response was better obtunded in group 2 and group 3 as compared to group 1 .In group 3 ,the hemodynamic parameters fell below the baseline value at 3 min after intubation and intubation response was completely obtunded. Neither hypotension nor bradycardia was observed in any of the groups. Sedation scores were more in group 2 and group 3 .None of the patients desaturated or needed O2 supplementation.

Comparison of HR between 3 groups

Parameter HRbpm	Group1	Group2	Group3	p
BASELINE	82.40± 4.65	81.45± 5.30	80.47± 5.25	P=0.67
1 min	111.33±5.80	85.47± 6.42	84.47 ±5.52	P<0.001
3min	105.04±3.65	84.33± 3.50	80.13 ±5.20	P<0.001
5 min	93.57± 6.01	78.45± 4.63	75.03± 4.80	P<0.001

Comparison of SBP between 3 groups

Parameter SBPmmHg	Group1	Group2	Group3	p
BASELINE	127.08± 8.10	128.63± 9.32	131.07± 7.04	P=0.66
1 min	158.12±7.08	135.10± 8.72	133.17 ±6.73	P<0.001
3min	146.13±6.12	128.57± 8.73	123.67±8.14	P<0.001
5 min	138.50±5.92	125.07± 8.57	116.90± 7.59	P<0.001

Comparison of DBP between 3 groups

Parameter DBPmmHg	Group1	Group2	Group3	p
BASELINE	76.40± 6.84	77.27± 4.91	73.97± 5.16	P=0.266
1 min	92.27±5.04	82.52± 3.52	77.43±4.26	P<0.001
3min	88.23±5.04	76.45± 4.72	72.35±4.16	P<0.001
5 min	84.53±5.14	74.31± 4.42	68.56± 4.61	P<0.001

Comparison of sedation scores

Time	Group1	Group2	Group3	P value
2 min	1	3	4	P<0.005
5min	2	4	4	P<0.006
10 min	2	4	5	P<0.001

DISCUSSION

Laryngoscopy and intubation is associated with a rise in heart rate, blood pressure and higher incidence of cardiac arrhythmias. These potentially dangerous changes disappear within 5 min of laryngoscopy[3].The use of @2 agonists like dexmedetomidine as a premedicant suppresses the sympathetic response to laryngoscopy and intubation.

Jaakola etal[4] reported significant reduction in BP and heart rate during intubation using 0.6ug/kg iv dexmedetomidine. Smitha etal [5]compared the effects of iv0.5 and 1ug/kg dexmedetomidine with normal saline in attenuating stress response and found that dexmedetomidine 1ug/kg iv was more effective than dexmedomidine 0.5ug/kg in obtunding hemodynamic variables to endotracheal intubation. The intergroup comparison revealed a statistically significant reduction in heart rate by dexmedetomidine than normal saline. These findings correlated with findings in our study. Menda etal[6] conducted a study comparing dexmedetomidine iv 1ug/kg with placebo on IHD patients undergoing fast tract coronary artery bypass graft. The author concluded that SBP increased significantly after intubation in placebo group when compared to preintubation period. It did not change significantly in the dexmedetomidine group.

Sebastian etal[7] compared iv dexmedetomidine 0.5ug/kg and 0.75ug/kg to normal saline in attenuating hemodynamic response to laryngoscopy and endotracheal intubation. Dexmedetomidine 0.75ug/kg effectively attenuated the stress response to laryngoscopy and endotracheal intubation without any adverse effects on hemodynamics and on respiratory system. These observations correlated with the findings in our study. Gulabani etal[8] compared dexmedetomidine iv 1ug/kg and 0.5ug/kg with lidnocaine iv 1.5mg/kg to maintain hemodynamic stability associated with intubation. Dexmedetomidine 1ug/kg was found to be more effective than dexmedomidine 0.5ug/kg and lignocaine.

In our study the sedation scores obtained were higher for dexmedetomidine group than normal saline group. Manne etal[9] also observed increasing sedation levels with low dose dexmedetomidine infusion. Sulhyan etal[10] and Belleville et al[11] observed that dexmedetomidine iv 1ug/kg caused increased sedation levels and need for oxygen supplementation. Belleville et al further observed that dexmedetomidine iv 1ug/kg and 2ug/kg caused irregular breathing with episodes of apnoea. Further, Keniya et al[12] and Menda et al reported that dexmedetomidine iv 1ug/kg has been associated with increased incidence of adverse effects like bradycardia and hypotension. Hence in our study, dexmedetomidine has been administered slowly as an infusion over 10 min. Though in our study group 3 had sedation scores of 4 and 5, none of them had fall in SpO2 below 95 % or needed O2 supplementation. None of the patients had bradycardia or hypotension.

CONCLUSION

Dexmedetomidine iv in the dose of 0.5ug/kg and 0.75 ug /kg was effective compared to normal saline in attenuating the hemodynamic stress response to laryngoscopy and endo tracheal intubation.

Dexmedetomidine iv 0.75ug/kg effectively and completely attenuated the hemodynamic stress response to laryngoscopy and endo tracheal intubation compared to 0.5ug/kg.

Dexmedetomidine iv in the doses of 0.5ug/kg and 0.75ug/kg were devoid of any significant adverse effect.

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