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COMPARISON OF CLONIDINE, DEXMEDETOMIDINE & FENTANYL FOR ATTENUATION OF HEMODYNAMIC RESPONSE TO LARYNGOSCOPY & ENDOTRACHEAL INTUBATION IN VALVULAR HEART SURGERY

Anaesthesiology

KEYWORDS:

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ABSTRACT

There have been a lot of studies comparing the hemodynamic response during laryngoscopy & tracheal intubation in patients not having cardiac pathology. This study was done to compare the response of clonidine, fentanyl & dexmedetomidine hemodynamically in patients of valvular heart disease undergoing valvular replacement. **METHOD** This is a hospital based randomized controlled double blind interventional study. Total 93 patients were selected & divided in 3 groups in which 31 patients were included in each group. The patients in group F were given I.V Fentany l, in group C were given I.V Clonidine & in group D were given Dexmedetomidine. Anaesthesia was maintained with Isoflurane, fentanly & vecuronium bromide. **RESULTS** In group D the mean change in Systolic B.P was higher as compared to group C&F 10 minutes after infusion. There was a statistically significant decrease in Diastolic B.P after 10 minutes of infusion in both group C & D. There was also a statistically significant decrease in Mean arterial pressure (MAP)10 minutes after infusion in group C &D from the baseline. Comparison of mean change in MAP between the 3 groups showed that the mean difference was significantly less in group F as compared to group C & D 10 minutes after & 7-10 minutes after intubation. There was also a statistically significant decrease in pulse rate 10 minutes after infusion in group C & group D as compared to baseline. **CONCLUSION** Clonidine & Dexmedetomidine showed a better response to attenuate the pulse rate & B.P which is statistically significant and can be recommended pre-operatively 10 minutes before to attenuate the sympathetic response to laryngoscopy & intubation.

INTRODUCTION

The placement of an endotracheal tube in the trachea while giving general anaesthesia always poses a significant response in the catecholamine levels. This results in a rise in H.R, SBP, DBP, intra-ocular pressure, intracranial pressure & potential for cardiac arrhythmias. (1) These responses are known as the cardiovascular responses to endotracheal intubation. (2) The arterial hypertension is due to increase in cardiac output rather than in SVR & is associated with the transient rise in CVP. Frequency & degree of haemodynamic variation are usually not that significant in healthy individuals. (3) But in patients with hypertension, CAD, valvular heart disease & intracranial tumors even transient changes can result in deliterios effects. (4)

AIM OF THE STUDY

To study the effects of Clonidine, Dexmedetomidine & Fentanyl on hemodynamic response to laryngoscopy & endotracheal intubation in patient's undergoing valvular heart surgeries.

STUDY DESIGN

Prospective, Randomized, Hospital Based, double blind interventional study.

METHODOLOGY

This study which is a hospital based randomized controlled double blind interventional study was done in the department of anaesthesia , with due permission from the institutional ethical committe & review board.Written & informed consent was taken from all patients.

A total of 93 patients were selected and divided into 3 groups ,in which each group included 31 patients.

Patients between the age 20-50 yrs with body weight 30 – 65 kgs of either sex undergoing valvular heart surgery under general anaesthesia were included. The exclusion criteria included anemia,(Hb<10 gms%), Mallampati grade 3 & 4,hypersentivity to any of the drugs, laryngoscopy time > 30 seconds, compromised renal status, pulmonary status(COPD, bronchial asthma), coagulation disorder, diabetes mellitus.

Each patient had a pre-anaesthetic checkup which included any significant present/past medical /surgical history, physical examination, vital parameters like B.P, pulse, respiratory rate & routine investigations which included echocardiography also.

Patients were randomly allocated to three groups (31 patients in each group).

Group F : received I.V infusion of fentanyl 2 micrograms /kg diluted upto 50 ml with normal saline(0.9%).

Group C : received I.V infusion of Clonidine 2 micrograms/kg diluted upto 50ml with normal saline(0.9%).

Group D : received I.V infusion of Dexmedetomidine 1 microgram/kg in 50ml normal saline(0.9%).

In this study blinding & randomization was done by chit & box method. The drug was given 10 minutes before intubation.

Baseline readings of heart rate, systolic blood pressure & diastolic blood pressure were noted before administration of drugs. I.V. line was secured . Invasive arterial line and neck line were also secured under local anaesthesia. The monitoring included ECG, IBP, CVP, SPO2 & end tidal co2.

After pre-oxygenation for 3 minutes, precalculated doses of Fentanyl, Clonidine & Dexmedetomidine were given I.V. slowly in group F, C & D respectively. Ten minutes after infusion patients were induced with I.V injection of Midazolam (0.1mg/kg) & Etomidate (0.2mg/kg) & Rocuronium (0.9mg/kg).Total duration of laryngoscopy was noted and > 30 sec. were excluded from the study.

Parameters like heart rate, systolic B.P, diastolic B.P were noted just after intubation & 1, 3, 5, 7 & 10 minutes after intubation. Anaesthesia

was maintained with oxygen, vecuronium, isoflurane & fentanyl. At the end of surgery patients were shifted to cardiac surgery I.C.U & ventilated post-operatively for 4-6hrs and reversed and extubated accordingly.

STATISTICAL ANALYSIS

All data were entered on excel sheet M S office excel 2007 & analyzed statistically using SPSS statistical software (ver.20.0.0.) & XL-stat.

All the outcome variables i.e. quantitative data were summarized in the form of mean ± S.D. The differences between proportions were analyzed using chi square test. The levels of significance & alpha error were kept 95% & 5% respectively, for all statistical analyses. P values <0.05 were considered as significant (cs).

RESULTS

PULSE RATE (PR):

No significant difference was observed in all three group after infusion and intubation except at 5 min. At But group D had significantly lower mean pulse rate than Group C at 5 min after intubation. Mean difference was significantly different in group C and D. Where more fall of mean PR was seen in group D as compared to group C at 10 min after infusion and significantly mean change was observed at 1, 3 and 5 min after intubation in group D and group F. No significant difference was observed in pulse rate from the baseline at 7 and 10 min, after intubation.

Mean Arterial Pressure (MAP):

Mean difference was significantly less in group F as compared to group C and D 10 min after infusion and 7 and 10 min after intubation . No significant difference was observed in MAP from the baseline at 1.3and.5, min after intubation among all the groups as compared to group D. At 7 and 10 min after intubation, group C showed more fall in MAP from the baseline as compared to group F.

Systolic Blood Pressure (SBP):

Mean difference was significantly higher in group D as compared to group C and F 10 min after infusion. No significant difference was observed in SBP at 1 and 3 min after intubation among all the groups but at 5 ,7 and 10 min after intubation Group F had significantly less change in mean SBP from the baseline as compared to group D.

Diastolic Blood Pressure (DBP):

No significant difference was observed in all three group at baseline. At each follow up time group F had significantly higher mean DBP than Group C and also with group D at 10min after infusion and 5min after intubation. Mean difference was significantly less in group F as compared to group C and D 10 min after infusion. No significant difference was observed in DBP from the baseline at 1.3.5,7 and 10 min after intubation among all the groups as compared to group D.

DISCUSSION

The hemodynamic responses to laryngoscopy and intubation, comprising of elevation in heart rate and rise in systolic and diastolic pressure, are well known. The potential for life threatening complications associated with these responses is also well documented. Traditionally used drugs like lignocaine, fentanyl, clonidine, esmolol etc are either not fully effective or are associated with considerable side effects at doses required to attenuate these responses. Therefore, it has become imperative to develop a novel technique/ drug to prevent these potentially hazardous responses. The patients in all the groups did not show any statistically significant differences in their age or sex distributions. We selected the optimal age range of 20 to 50 years. This is because, the variability of the heart rate changes decreases with increasing age and younger patients show more extreme changes. The anaesthetic technique was chosen such that the drugs which were administered did not have any significant effects on the heart rate or the blood pressure. All the groups were similarly given the drug infusion before 10 min of induction.

The drugs for controlling these hemodynamic responses aim to stabilize heart rate and blood pressure during laryngoscopy and intubation in order to prevent any rise in myocardial work load and oxygen demand as well as to preserve the perfusion of vital organs (Fox EJ et al 1977) [6]. Sung et al., (2000) have also shown that a premedication with clonidine helped in
providing a perioperative haemodynamic stability [7].

Yokota et al., (1998) concluded that the clonidine premedication might contribute to a haemodynamic stability during a sedated fiberoptic nasal intubation [8]. Similar results were obtained in other studies (Costello and Cormack) [9]. Nand Kishore Kalra concluded that intravenous clonidine showed the best control of the systolic BP and no significant episodes of hypotension, which was similar to our study. Sameena Kousar et al showed clonidine superior to fentanyl. Our study also showed clonidine superior to fentanyl in obtunding sympathetic response to laryngoscopy and intubation. But in our study dexmedetomidine was superior to both clonidine and fentanyl. Ten minutes after intubation, in all three group all variables return to normal. All the above mentioned facts suggest that clonidine, dexmedetomidine and fentanyl were effective in stabilizing the hemodynamics of patients during and after laryngoscopy and intubation. Also provided intra-operative stability without significant increase in incidence of side effects.

Ten minutes after drug infusion, group C and Group D showed a decrease in PR, SBP, DBP, MAP which was highly significant.

After 1 minute of intubation Group D showed a decrease in SBP & PR as compared to the other two groups. After 3 minutes of intubation in Group D SBP and PR decreased non-significantly. After 7 minutes of intubation in Group C DBP, MAP returned to baseline but SBP, PR increased. In Group D all the variables decreased. In group F MAP decreased but PR, SBP and DBP increased comparable to baseline. Ten minutes after intubation in all the three groups all variables return to normal.

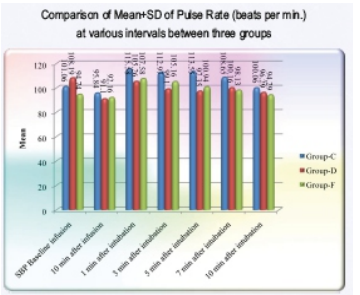
All the above facts suggest that clonidine, deximedtomidine anf fentanyl were effective in establishing the hemodynamics of patients during and after laryngoscopy and intubation. They also provided intra-operative stability without significant increase in the incidence of side effects.

CONCLUSION

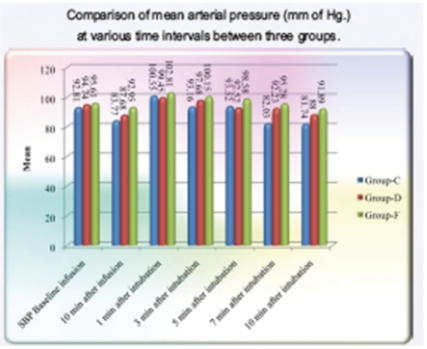
Clonidine, dexmedetomidine and fentanyl blunt the hemodynamic response to endotracheal intubation in patients undergoing valvular heart surgery under general anesthesia and can be safely used at induction of general anesthesia. We found that dexmedetomidine attenuate's the pressure response to laryngoscopy and intubation more than clonidine and fentanyl.

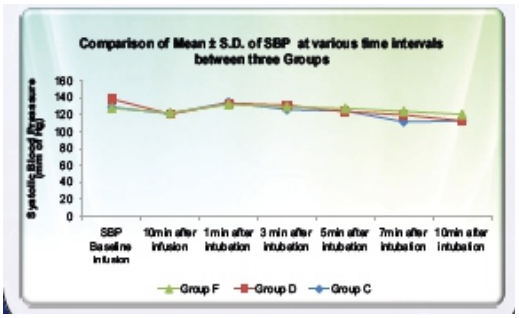
Demographic Profile and Baseline Variables

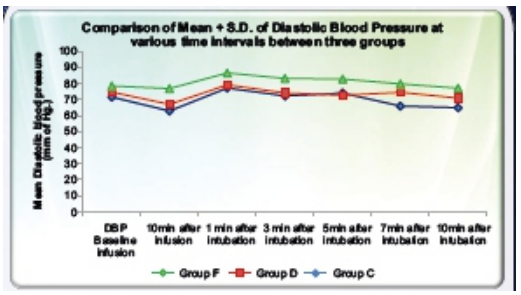
Patient characteristics	Group C(n=31) (mean±S.D)	Group D(n=31) (mean±S.D)	Group F(n=31) (mean±S.D)	P value
Age (years)	35.65 ± 12.18	35.84 ± 10.86	33 ± 9.9	> 0.05
Gender distribution				
Males	15	13	8	
Females	16	18	23	0.17
Procedure				
Aortic valve replacement	5	2	2	
Mitral valve replacement	18	22	23	
Double valve replacement	8	7	6	0.57
HR (beats/min)	101.06±26.74	108.19±22.30	94.71±23.61	0.09
SBP (mm Hg)	129.06±23.36	138.48±16.74	127.71±14.78	0.05
DBP (mmHg)	71.52±12.98	74.58±11.65	78.42±7.82	0.05
MAP (mmHg)	92.81±8.23	94.74±10.60	95.61±6.89	0.43
SPO_2 (%)	97.61±1.26	97.97±0.84	97.65±1.28	0.4



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