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COMPARISON OF FENTANYL AND CLONIDINE FOR ATTENUATION OF HAEMODYNAMIC RESPONSE TO LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION IN VALVULAR HEART SURGERY

Anesthesiology

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ABSTRACT

Background & Aim: Endotracheal intubation & Laryngoscopy is an integral part of anaesthesiologist's contribution to patient care, but the procedure results in changes of various hemodynamic parameters. In order to block the noxious stimuli that evoke a transient but marked sympathetic response various drugs have been used which blocks the cardiovascular response. The aim of the study was to assess the efficacy of Fentanyl and Clonidine in blocking the cardiovascular response to laryngoscopy and intubation and ensuring stable hemodynamics.
Method: A randomized, double blind, comparative study was conducted with 62 patients divided randomly into two groups, Group Clonidine and Group Fentanyl. Baseline parameters of the patients were recorded before drug administration. Injection Etomidate 0.6 mg/kg i.v slowly followed by Injection Rocuronium 2mg/kg i.v given. Haemodynamic parameters IBP, HR, SpO2 measured after intubation 1,3,5,7,10 min.
Result: Hemodynamic parameters were increased just after laryngoscopy and intubation compared to baseline. After few minutes hemodynamic parameter were stabilised.
Conclusion: Clonidine and fentanyl blunts the hemodynamic response to endotracheal intubation in patients undergoing valvular heart surgery under general anaesthesia and can be safely used at induction of general anaesthesia. Clonidine shows more attenuated pressure response to laryngoscopy and intubation compared to fentanyl.

KEYWORDS

Laryngoscopy, Endotracheal intubation, Fentanyl, Clonidine

INTRODUCTION

Endotracheal intubation helps in maintaining the patency of the upper airway, controlling the ventilation and delivering inhalational anaesthetic agents from the anaesthesia machine to the patient through the breathing circuits. The placement of an endotracheal tube in the trachea leads to significant rise in catecholamine levels[1]. This results in cardiovascular response like rise in heart rate, systolic blood pressure, diastolic blood pressure, intraocular, intracranial pressure and potential for cardiac arrhythmias[2].

Fentanyl is a potent synthetic opioid agonist and phenylpiperidine derivative with rapid onset, short duration of action, peak effect at 5-7 minutes and is known to decrease sympathetic response to noxious stimuli.[3,4]. High dose fentanyl provides cardio-stability and would prevent the increase in heart rate and blood pressure that is associated with laryngoscopy but may cause worrisome respiratory depression, bradycardia and hypotension or chest wall rigidity[5]. Clonidine or calcium blockers, seem to be less effective or less convenient in preventing the haemodynamic alterations[6].

Many methods have been suggested to attenuate these responses. But deep level of anaesthesia may not be tolerated by many patients. So drugs that tend to block the responses to laryngoscopy and intubation or antihypertensive drugs are preferred. In this study two drugs were used, fentanyl and Clonidine to assess their efficacy in blocking the cardiovascular response to laryngoscopy and intubation and ensuring stable hemodynamics during laryngoscopy and intubation.

METHOD

A randomized, double blind, comparative study was designed with due permission from the Institutional Ethical Committee and written informed patient consent was obtained. The patients were randomly divided using chit and box method in 2 groups according to drug used.

Group C- Clonidine with concentration 2mcg/kg (50ml total volume)

Group F- Fentanyl citrate with concentration 2mcg/kg (50 ml total volume)

On arrival in the operation theatre, fasting status, consent and PAC was checked. Baseline parameters i.e. heart rate (HR), Systolic blood pressure (SBP), Diastolic blood pressure (DBP) were noted before administration of drugs. Intravenous line were secured, premedication IV midazolam was given 10 minutes before induction. ECG, Pulse oximeter were connected. Arterial cannulation and internal jugular venous cannulation were done. Test drug (Fentanyl/Clonidine) were commenced in a double blind fashion. All drugs were given slowly within 10 min.

All the hemodynamic measurements were made by yet another anaesthesiologist who was blinded to the groups. The patients were preoxygenated for 3 min after study drug with 100% O_2. Induction of anaesthesia was done with Injection Etomidate 0.6 mg/kg i.v slowly followed by Injection Rocuronium 2mg/kg i.v given. Patient was ventilated with Bains circuit with 100% oxygen for 90 seconds. Hemodynamic parameters were recorded after intubation.

Intubation was done with cuffed endotracheal tube of appropriate size after direct laryngoscopy by an experienced anaesthesiologist. Tube position was checked by auscultation of chest and fixed haemodynamic parameters IBP, HR, SpO2 measured after intubation 1,3,5,7,10 minute. Maintenance was done with 100% O_2 by using closed circuit. Muscle relaxation was provided by Injection Vecuronium 0.1mg/kg loading dose then 0.01mg/kg subsequent dose.

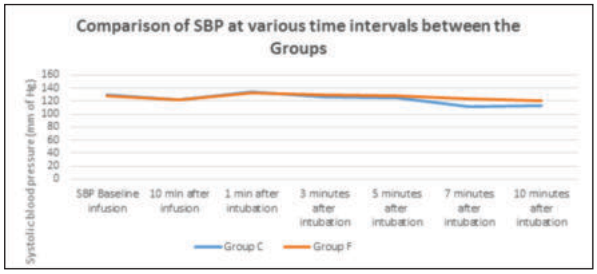
All the data were entered on Excel sheet *M.S.Office Excel-2007* and analysed statistically using SPSS Statistical software *(version.18.0.0)* and XL- Stat. The difference between mean values of the two groups was analysed using ANOVA one way test and within groups using paired t-test.

All the qualitative data were summarized in the form of proportions and were analysed using Chi square test. The levels of significance and α - error were kept 95% and 5% respectively, for all statistical analyses. P values <0.05 were considered as Significant (S) and P value > 0.05 as statistically non Significant (NS).

OBSERVATIONS AND RESULTS

Comparison Of Systolic Blood Pressure At Various Time Intervals Between The Groups

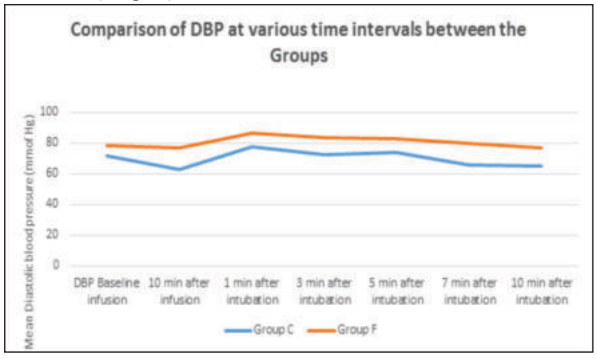
In both Group C and F, statistically significant decrease in SBP 10 minutes. after infusion was seen compared to baseline and statistically insignificant decline was observed after 1, 2, 5 and 10 minutes. No significant difference was observed in both the groups at each time interval except at 7 min where Group F have significantly higher mean SBP than Group C (Graph 1).



Graph 1: Comparison Of Systolic Blood Pressure At Various Time Intervals Between The Groups

Comparison Of Diastolic Blood Pressure At Various Time Intervals Between The Groups

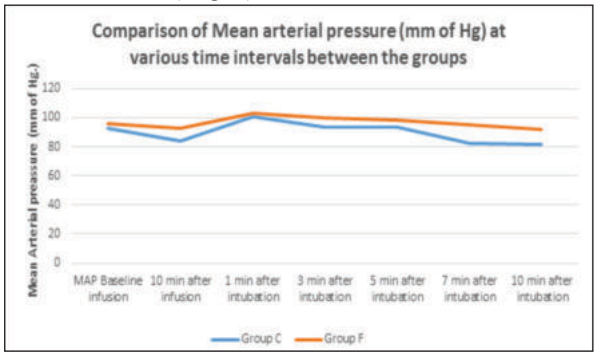
In DBP compared to baseline, statistically significant decrease was seen in Group C 10 minutes after infusion whereas in Group F slight decrease was noted. The DBP at 1 minute after intubation increased and fall after 3,5,7,10 min after intubation gradually but in Group C significantly more fall was seen comparable to baseline at 10 min after intubation. At each follow up time, Group F had significantly higher mean DBP than Group C at 10min after infusion and 5min after intubation (Graph 2).



Graph 2: Comparison Of Diastolic Blood Pressure At Various Time Intervals Between The Groups

Comparison Of Mean Arterial Pressure (mm of Hg.) At Various Time Intervals Between The Groups

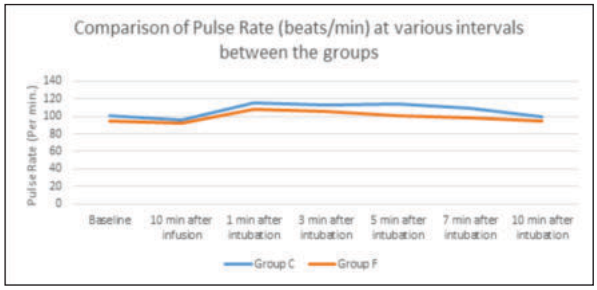
In mean arterial pressure compared to baseline, statistically significant decrease was seen in Group C 10 minutes after infusion whereas in Group F slight decrease was noted. The mean arterial pressure at 1 minute after intubation significantly increased and fell after 3,5,7,10 minutes gradually, but significant fall was present in Group C at 7 and 10 minutes after intubation and statistically insignificant fall was present in Group F. Significantly higher mean mean arterial pressure was seen in Group F than Group C at 10 minutes after infusion and 7,10 min after intubation (Graph 3).



Graph 3: Comparison of Mean arterial pressure (mm of Hg.) At Various Time Intervals Between The Groups

Comparison of Pulse Rate (beats per min,) At Various Intervals Between The Groups

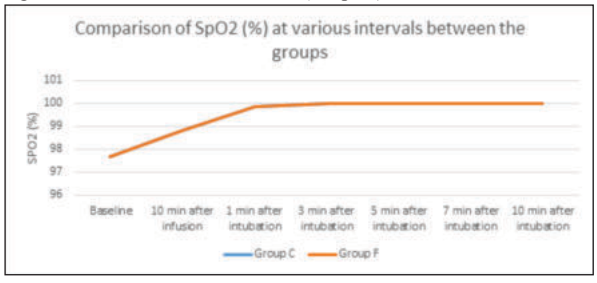
In Group C and F compared to baseline, statistically significant decrease in pulse rate 10 minutes after infusion was noted. The pulse rate at 1 min. after intubation significantly increased and fall after 3, 5, 7,10 min after intubation gradually but fall in pulse rate was not statistically significant (Graph 4).



Graph 4: Comparison Of Pulse Rate (beats per min,) At Various Intervals Between The Groups

Comparison of SPO2 (%) At Various Intervals b/w The Groups

Mean SPO2 was increased after 10 minutes with infusion and 1,3,5,7 and 10 min after intubation which was Significantly different from the baseline among all the groups. In inter group comparison, no significant difference was observed at baseline 10 minutes after infusion and intubation but at 1,3,5 and 7 min after intubation significant difference was observed (Graph 5).



Graph 5: Comparison of SPO2 (%) At Various Intervals B/W The Groups

Comparison Of Intra-operative Side Effects Between The Groups

Although intraoperative side effects like bradycardia or tachycardia was observed more in group C compared to group F, the difference in proportion was not significant (Table 1).

Table 1: Comparison Of Intra-operative Side Effects Between The Groups

	Group C(N=31)		Group F(N=31)		
	No	%	No	%	Chi Square Test
BRADYCARDIA	5	16.13	0	0	P = 0.076 NS
TACHYCARDIA	10	32.26	6	19.35	P = 0.386 NS
HYPOTENSION	1	3.23	2	6.45	P = 0.356 NS
HYPERTENSION	0	0.00	1	3.23	P = 0.364NS

DISCUSSION

The hemodynamic responses to laryngoscopy and tracheal intubation from reflex sympathetic discharge result from epipharyngeal stimulation. **(King BD et al 1951)** [7]**.** It is logical to select an agent which would prevent or minimize the laryngopharyngeal stimulation by the intubation process or an agent which would block the sympathetic activity associated with it.

The results of the study are comparable to **Gupta and Tank**[8] who noticed similar trends in pulse rate before intubation and after intubation. The study also validates the findings of C**hung MD and Raymonds et al** [9] who reported that a single dose of Fentanyl 2mcg/Kg given preoperatively decreases the heart rate. **Channaiah et al** [10]also obtained the same result just before intubation and 1 and 3 minutes after intubation using 2µ/kg Fentanyl 5 minutes before intubation. **Bostan and Eroglu** [11] also obtained the similar result just before intubation and 1 and 3 minutes after intubation using 1µ/kg Fentanyl 3 minutes before intubation. **Ezike and Nwosu**[12] treated the patient with Fentanyl premedication 4µg/kg showed effective attenuation of the cardiovascular response.

The results of the study are a little different from the findings of **Hassani et al.**[13] who noted a significant fall in heart rate compared to baseline immediately after intubation.

The study showed similar results to **Sameena kousar, Mahesh, K.V.**

Srinivasan[14] **(2012)** Clonidine showed better attenuation of the sympathetic response, which is statistically highly significant and it remained so till the end of 10 minutes. Intravenous clonidine 2µg/kg which is administered 5 minutes before the laryngoscopy can be recommended to attenuate the sympathetic response to the laryngoscopy and the intubation.

These findings show similar results to those observed by **Sarvesh p. singh, abdul quadir, punam malhotra et al**[15] who noticed similar trends in SBP after intubation upto 10 min in placebo group. The study also validates the findings of **Keun Sam Chung et al.** [16] The results are different from the findings of **Roelofse et al**[17] and **Inada et al**[18] they were found no difference between study drug and placebo after intubation it was due to different time of giving the study drug, there was no peak effect of drug at the time of intubation.

After 10 minutes of Fentanyl drug infusion, the mean blood pressure decreased significantly compared to baseline and after 1minute of intubation there was a significantly increased mean arterial pressure and 3 minutes there was high mean arterial pressure and after 5 minutes. Not significant high mean arterial pressure as compared to baseline and 10 minutes after significantly lower mean arterial pressure comparable to baseline. These results were similar to the results of **Shobhana Gupta and Purvi Tank** [8]**.** And **Keun Sam Chung et al** [16] and **Sarvesh p. singh et al** [15] while **Randy L. McGee**[19] didn't compare the mean blood pressures.

The incidence of hypotension, ECG changes and bradycardia was not much different between the groups. In group C five patients (16.13 %) developed bradycardia (pulse rate <50 beats per minute) after the study period of 10 min and had to be given atropine in 0.2 mg increments (max. 0.01 mg/kg). **Gupta Kumkum, Lakhanpal Mahima et al**[20] observed one case of bradycardia out of 32 (3.2%) during study period of laproscopic cholicystectomy, fentanyl compare with clonidine.

CONCLUSION

Clonidine and Fentanyl blunts the hemodynamic response to endotracheal intubation in patients undergoing valvular heart surgery under general anesthesia and can be safely used at induction of general anaesthesia. Clonidine shows more attenuated pressure response to laryngoscopy and intubation compared to fentanyl.

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