VOLUME-7, ISSUE-4, APRIL-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Anaesthesiology

EFFECT OF INJ. ESMOLOL AND INJ. FENTANYL ON HAEMODYNAMIC CHANGES DURING LARYNGOSCOPY &TRACHEAL INTUBATION- A COMPARATIVE STUDY

Dr Abhay Raj Yadav

Dr Neelesh Nema* *Corresponding Author

Dr Aditya Agarwal

ABSTRACT

Aim and objectives:

1) To evaluate the effects of Esmolol and Fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
2) To compare the effect of Esmolol and Fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
3) To compare the side effects.

Materials & Methods

This prospective observational study was conducted on 80 patients of ASA Grade I & II , undergoing elective surgeries under general anesthesia.

Group A : Injection Esmolol 2 mg/kg i.v. 3 min before laryngoscopy and intubation, over 30 seconds.

Group B; Injection Fentanyl 2 µg/kg i.v. 3 min before laryngoscopy and intubation, over 30 seconds.

All patient received Inj. Pentazocine 0.3mg/kg and were pre-oxygenated for 3min. Anaesthesia was induced with thiopantone sodium (5mg/kg IV) till loss of eyelashreflex over 30 second and mask ventilation was confirmed. Inj succhinylcholine 1.5mg/kg was given to facilitate laryngoscopy and intubation. anaesthesia was maintained with oxygen nitrous oxide ,halothane with intermittent use of inj. Atracurium and controlled ventilation.

At the end of surgery the neuromuscular blockade was antagonized with inj. Glycopyrolate (.01mg/kg)I.V.and inj. Neostigmine(.05mg/kg)i.v. and patient were extubated.

RESULT

Esmolol is more effective than Fentanyl in attenuation of haemodynamic changes during laryngoscopy and intubation.

CONCLUSION

Esmolol significantly attenuates the haemodynamic changes during laryngoscopy and intubation. Fentanyl also significantly attenuates the haemodynamic changes during laryngoscopy and intubation.Thus we conclude that Esmolol is a better drug to attenuate the haemodynamic response during laryngoscopy and intubation.

KEYWORDS : Esmolol, Fentanyl, hemodynamic response, laryngoscopy and orotracheal intubation.

INTRODUCTION

The pressure response to laryngoscopy and endotracheal intubation in form of tachycardia, hypertension and arrhythmias may be potentially dangerous.

Endotracheal intubation is the translaryngeal placement of a tube into the trachea via nose or mouth. The technique of laryngoscopy and intubation induces noxious stimuli that lead to extreme haemodynamic stress which is associated with intense sympathetic activity marked by tachycardia and hypertension.

The increase in pulse rate and blood pressure are usually transitory, variable & unpredictable. Normal, healthy persons tolerate this response, but in susceptible and high risk individuals, this transient sympathetic response can evoke life-threatening conditions.

Various non-pharmacological & pharmacological methods have been used to attenuate the haemodynamic response to laryngoscopy & endotracheal intubation.

Esmolol is an ultra-short acting β-1 adrenergic blocker. It has predominant effect on β-receptors and possesses no significant membrane stabilizing activity. It has rapid onset and a short duration of action.

Fentanyl is a phenylpiperidine of the 4-amino piperdine series, structurally related to, but not derived from pethidine

AIMS AND OBJECTIVE

1) To evaluate the effects of Esmolol and Fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
2) To compare the effect of Esmolol and Fentanyl on haemodynamic changes during Laryngoscopy and tracheal intubation.
3) To compare the side effects, if any.

MATERIAL AND METHOD

The study was conducted on patients undergoing laryngoscopy and tracheal intubation in elective surgeries under general anesthesia.

This prospective observational study was conducted on 80 patients in the age group of 20 to 50 years, ASA Grade I & II of either sex, undergoing elective surgeries under general anesthesia.

Patients were divided in to two groups comprising 40 patients each:-

Group(A) Esmolol Group; Injection Esmolol 2 mg/kg i.v. 3 min before laryngoscopy and intubation, over 30 seconds.

Group(B) Fentanyl Group; Injection Fentanyl 2 µg/kg i.v. 3 min before laryngoscopy and
intubation, over 30 seconds.

Material:- The study includes drugs Esmolol 10mg/ml 10ml vial and inj. Fentanyl 50mcg/ml 2ml ampoule,

PATIENT EXCLUSION CRITERIA:

1) Mitral stenosis, Left. ventricular dysfunction, Atrioventricular

conduction block, predicted difficult intubation,asthma, chronic obstructive airway disease,, any liver or renal disease

2) Pts taking antihypertensives, analgesics, sedatives, beta-blockers.

On the day prior to surgery pre anesthetic evaluation was done and patients were explained about the procedure and technique and written informed consent was taken.

All routine investigations like Complete blood count,Urine (routine ,microscopic),Blood urea,creatinine, Blood sugar, Electrocardiogram were done prior to surgery.

Pre-Medication:
All patient were given Inj glycopyrolate0.2mg IV, and inj. Ondensetran 4mgIV , Inj Ranitidine Hydrochloride 50mgIV before infusion.

TECHNIQUE AND METHOD :-
On the day of surgery, Anaesthesia machine and circuits were checked, resuscitation equipments were kept ready. after confirmation of NPO status , patients were shifted to the operating room and connected to monitor.

Preoperative base line parameters, were recorded after 5 min of settling in the operative room and also after infusion of Esmolol/ Fentanyl (T1) All patient received Inj. Pentazocine 0.3mg/kg and were pre-oxygenated for 3min. Anaesthesia was induced with thiopantone sodium (2.5% 5mg/kg IV) till loss of eyelash reflex over 30 second and mask ventilation was confirmed. Inj succhinylcholine 1.5mg/kg was given to facilitate laryngoscopy and intubation. At the onset of apnea using laryngoscope, intubation was done with a well lubricated appropriate size cuffed endotracheal Tube and anaesthesia was maintained with oxygen nitrous oxide ,halothane with intermittent use of inj. Atracurium and controlled ventilation.
At the end of surgery the neuromuscular blockade was antagonized with inj. Glycopyrolate (.01mg/kg) I.V.and inj. Neostigmine(.05mg/kg)i.v. and patient were extubated after complete reversal of neuromuscular blockade.

DATA COLLECTION

Sequence	HR	SBP	DBP	COMPLICATION
Basal reading when pt.is shifted to OT(T0)				After Induction (T1)After intubation(T2)At 2 min after intubation(T3)At 6 min after intubation(T4)At 10 min after intubation(T5)

STATISTICAL ANALYSIS PLAN: Statical analysis was done using statistical package for social sciences version 15.0.chi-square test ,Unpaired t-test were used.

OBSERVATIONS AND RESULTS
Observation duly recorded, have been tabulated and statistically analyzed in this section. Comparison of quantitative data between groups was done by unpaired t-test. A p<0.05 was considered clinically significant.

Table 1: Demographic profile of patients:

Demographic profile	Esmolol -GP Mean±SD	Fentanyl -GP Mean±SD	p-value
Age(yrs)	33.06±4.86	33.13±5.44	>0.05
Gender(M:F)	22:18	21:19	>0.05
Weight(kg)	46.22	46.04	>0.05

Inference:- Demographic profile in term of age ,sex, weight were comparable in both the groups.

P-values;-
p>0.05- Statistically not significant (NS),
p<0.05- Statistically significant (S),
p<0.01- Statistically highly significant (HS),
p<0.001- Very highly significant.

Table 2: Age distribution in two groups

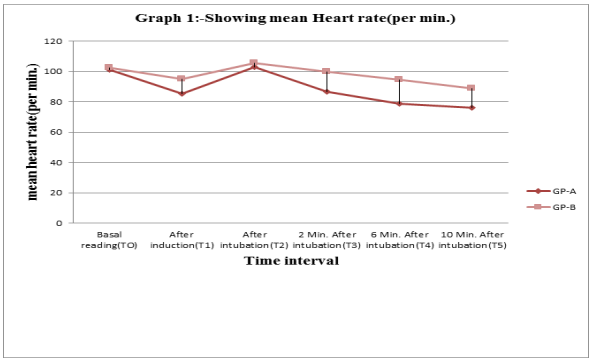
Age Group (in years)	Esmolol -Group		Fentanyl-Group	
	No. of Pts.	%	No.of Pts.	%
20-29	16	40	15	37.5
30-39	18	45	20	50
40-49	06	15	05	12.5
Mean age and SD of Patients	33.06±4.86	33.13±5.44		
p value >0.05				

The above table shows age wise distribution in both the groups. the minimum age in Esmolol and Fentanyl groups were 26 and 25 years respectively. the maximum age in Esmolol and Fentanyl groups were 44 and 45 years respectively. there was no significant difference in the age of patients between the group-A and group-B. both group were similar with respect to age distribution

Table 3: Showing Mean Heart rate of patients in both the groups

Time	Esmolol -Group		Fentanyl -Group		P-Value
	mean ±SD	% Change from baesline	mean ±SD	% Change from baseline	
Basal reading when pt.is shifted to OT(T0)	101.06 ±4.46		102.66 ±1.64		>0.05
After induction(T1)	85.33 ±3.34	15.56	95.13 ±1.67	7.33	<0.05
After intubation(T 2)	103.13 ±3.20	2.04	105.73 ±2.10	2.99	<0.01
At 2 min after intubation(T 3)	86.62 ±3.0	14.28	99.94 ±1.36	2.64	<0.05
At 6 min after intubation(T 4)	78.83 ±4.11	21.99	94.43 ±1.37	8.01	<0.05
At10min after intubation (T5)	76.16 ±2.80	24.63	89.66 ±1.38	12.66	<0.05

Inference:-
The baseline heart rate was comparable in both the group(p>0.05). At the time of laryngoscopy and intubation, heart rate increased in both Esmolol & Fentanyl group but more in Fentanyl group (p<0.01). There was continuous decrease in heart rate at 2,6,10 minutes after intubation in both groups, but the mean heart rate at any time was lower in the Esmolol group than in the Fentanyl group which was statistically significant (p<0.05).



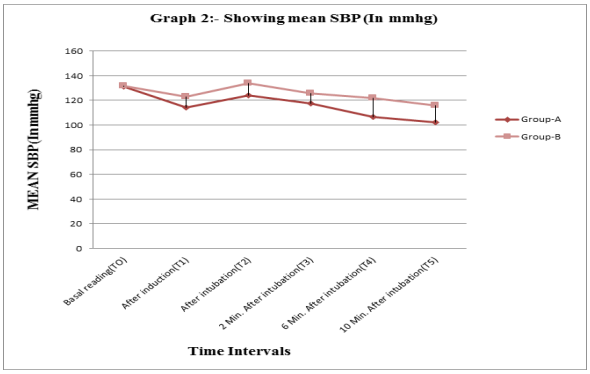
GRAPH SHOWING MEAN HEART RATE OF BOTH THE GROUP

Table 4: Showing mean systolic blood pressure(in mmHg) of patients in both the groups

Time	Esmolol -Group		Fentanyl -Group		P-value
	mean±SD	% Change from baseline	mean±SD	% Change from baseline	
Basal reading when pt.is shifted to OT(T0)	131.43±1.72		131.72±2.53		>0.05
After induction(T1)	114.2±2.72	13.10	122.8±5.24	6.77	<0.05
After intubation(T2)	124.26±3.48	5.45	133.96±2.48	1.70	<0.01
At 2 Min.after intubation(T3)	117.25±3.77	10.78	125.8±3.44	4.49	<0.05
At 6 min after intubation(T4)	106.35±2.83	19.08	122.13±4.84	7.28	<0.05
At10 min after intubation(T5)	102.25±1.75	22.20	115.86±	12.04	<0.05

Inference:-

The baseline SBP were comparable in both the group(p>0.05). At time of laryngoscopy and intubation, SBP increased in both Esmolol & Fentanyl group but more in Fentanyl group (p<0.01).There was continuous decrease in SBP at 2,6,10 minutes after intubation in both groups but the mean SBP at any time was lower in the Esmolol group than in the Fentanyl group which was statistically significant (p<0.05).



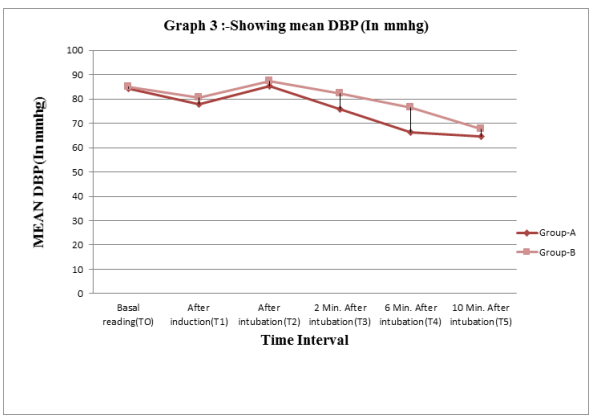
ABOVE GRAPH SHOWING MEAN SBP OF BOTH THE GROUP

Table 5: Showing mean Diastolic blood pressure(in mmHg) of patients in both the groups

Time	Esmolol -Group		Fentanyl -Group		P-value
	mean±SD	% Change from baseline	Mean±SD	% Change from baseline	
Basal reading when pt. shifted to OT (T0)	84.33±3.64	-	84.83±4.60	-	>0.05
After induction(T1)	77.75±2.52	7.80	80.54±5.40	5.05	<0.05
After intubation(T2)	85.20±4.20	1.03	87.25±4.36	2.85	<0.01
At 2 Min. after intubation(T3)	75.82±4.14	9.97	82.26±4.75	3.02	<0.05
At 6 Min. after intubation(T4)	66.26±2.41	21.42	76.55±7.35	9.76	<0.05
At 10 Min.after intubation (T5)	64.72±2.64	23.25	67.63±7.30	20.27	<0.05

Inference:-

The baseline DBP were comparable in both the group(p>0.05). At time of laryngoscopy and intubation, DBP increase was seen in both Esmolol & Fentanyl group but more in Fentanyl group (p<0.01). There was continuous decrease in DBP at 2,6,10 minutes after intubation in both groups, but the mean DBP at any time was lower in the Esmolol group than in the Fentanyl group which was statistically significant (p<0.05).



ABOVE GRAPH SHOWING MEAN DBP OF BOTH THE GROUP

Table 6: Showing complication of patients in both the groups

COMPLICATION	Esmolol -group	Percentage (%)	Fentanyl -group	Percentage (%)
Hypotension	-	-	2	5
Bradycardia	1	2.5	1	2.5

The above table showing that in Esmolol Group 1 patient had bradycardia intraoperatively which was statistically insignificant. it was immediately corrected with atropine 0.6 mg. In the Fentanyl group 2 patients developed hypotension . it responded with 500ml of IV ringers lactate administration within 10 minutes . 1 patient had bradycardia it was immediately corrected with atropine 0.6 mg. it was also statistically insignificant.

RESULT

Both groups were comparable in their age, gender and body weight distribution (p>0.05).

The basal mean HR±SD in the present study Group A and Group B was 101.06±4.46 and 102.66±1.64 bpm respectively.

Both groups had rise in HR after intubation that was 2.04% in group A and 2.99% in group B and difference was statistically highly significant (p<0.01).

Difference in HR between two groups remained statistically significant at 2,6 and 10 min after intubation (p<0.05).

The basal mean SBP in the present study in, Group A and Group B were 131.43±1.72, 131.72±2.53 mmHg respectively.

Both group had maximum rise in SBP after intubation that was 5.45% in group A and 1.7% in group B which was statistically highly significant (p<0.01).

Difference in SBP between two groups remained statistically significant at 2,6and 10 min after intubation (p<0.05).

The basal mean±SD, DBP in the present study in Group A and Group B were 84.33±3.64, 84.83±4.60 mmHg respectively.

Both group had maximum rise in DBP after intubation that was 1.03% in group A and 2.85% in group B which was statistically highly significant (p<0.01).

Difference in DBP between two groups remained statistically significant at 2,6 and 10 min after intubation(p<0.05).

In Esmolol group no any patients had hypotension and one patient had bradycardia, while in Fentanyl group 2 patients had hypotension and 1 patient had bradycardia.

DISCUSSION

Laryngoscopy and tracheal intubation are considered as the most critical events during administration of general anaesthesia as they provoke transient but marked sympatho-adrenal response manifesting as hypertension and tachycardia. Many drugs have been tried by various authors for blunting haemodynamic responses to laryngoscopy and intubation. Esmolol has been used in various bolus does or in an infusion form. Esmolol, 2mg/kg, as a single bolus successfully attenuated the pressure response.

Demographic criteria:-

Two groups were comparable and there was no statistically significant Difference between the mean ages,sex and weight .

In this study optimal age range was 20 to 50 years. The mean values of age with standard deviations are 32.06±4.96 and 32.13±5.34 for Esmolol and Fentanyl groups respectively. there were no significant difference between two groups. (P>0.05)

Heart rate changes:-

The basal mean HR±SD in the present study Group A and Group B was 101.06±4.46 and 102.66±1.64 bpm respectively.

After intubation in Group A there was only 2.04%(103.13±3.20) increase in mean HR was observed from its basal value(101.06 ±4.46), whereas in Group B there was 2.99% (105.73±2.10) increase in mean HR was observed from its basal value (102.66 ±1.64), which was statistically highly significant compared to Group-A(P<0.01).

At 2,6 minutes after intubation in Group A there was only 14.28%(86.62±3.0), 21.99%(78.83±4.11) respectively decrease in mean HR was observed from its basal value(101.06 ±4.6), whereas in Group B there was 2.64%(99.94±1.36), 8.01%(94.43±1.37) respectively decrease in mean HR was observed from its basal value(102.66 ±1.64), which was statistically significant compared to Group-A (P<0.05)

Similar to our study Christopher et al. used esmolol 1-2 mg/kg and concluded that the increase in heart rate and blood pressure associated with laryngoscopy and endotracheal intubation were significantly lower in comparison to the control group.

Systolic blood pressure changes:-

The basal mean SBP in the present study in, Group A and Group B were 131.43±1.72, 131.72±2.53 mmHg respectively.

After intubation in Group A there was 5.45%(124.26±3.48) increase in mean SBP was observed from its basal value(131.43±1.72), in Group B there was 1.70%(133.96±2.48)increase in mean SBP was observed from its basal value(131.72±2.53), which was statistically highly significant compared to Group-A (P<0.01).

At 2, 6,minutes after intubation in Group A there was 10.78%(117.25±3.77), 19.08(106.35±2.83) respectively decrease in mean SBP was observed from its basal value(131.43±1.72). whereas in Group B there was 4.49%(125.8±3.44) ,7.28%(122.13±4.84) respectively decrease in mean SBP was observed from its basal value(131.72±2.53),which was statistically significant compared to Group-A (P<0.05).

Similar to our study Sabahat et al Esmolol in bolus doses 100 mg and 200 mg attenuates tachycardia and hypertension after tracheal intubation.

Similar to our study Yushi et al. in his study concluded that 2 µg/kg fentanyl suppresses the hemodynamic response to endotracheal intubation more than the response to laryngoscopy.

Diastolic blood pressure changes:-

The basal mean±SD, DBP in the present study in Group A and Group B were 84.33±3.64, 84.83±4.60 mmHg respectively.

After intubation in Group A there was 1.03%(85.20±4.20) increase in mean DBP compared to basal value (84.33±3.64), Group B there was 2.85% (87.25±4.36) increase in mean DBP compared to basal value(84.83±4.60), which was statistically highly significant from compared to Group-A (P<0.05).

At 2,6 minutes after intubation in Group A there was 9.97% (75.82±4.14), 21.42%(66.26±2.41) respectively decrease in mean DBP was observed from its basal value (84.33 ±3.64) ,in Group B there was3.02 % (82.26 ±4.75), 9.76 % (76.55 ±7.35) respectively decrease in mean DBP compared to basal value (84.83 ±4.60) ,which was statistically significant compared to Group-A (P<0.05).

CONCLUSION

Following conclusion are drawn from the present study:-

- Esmolol and Fentanyl significantly attenuates the haemodynamic changes during laryngoscopy and intubation.
- Esmolol is more effective than Fentanyl in attenuation of haemodynamic changes during laryngoscopy and intubation.
- Thus we conclude that Esmolol is a better drug to attenuate the haemodynamic response during laryngoscopy and intubation.

REFERENCES:-

[1] Fox EJ, Sklar GS, Hill CH, Villanueva R, King BD. Complication related to the pressor response to endotracheal intubation, Anaesthesiology. 1977:47:524-5.

[2] Karl et al Insertion of LMA in place of endotracheal intubation to attenuate the cardiovascular response. IJA, 1999;43:30-35.

[3] Kumar et al- Blocking Glossophryngeal & superior laryngeal nerve to attenuate the cardiovascular response to laryngoscopyv& endotracheal intubation.IJA,1993;41:20-25

[4] KING BD, HARRIS LC, Jr, GREIFENSTEIN FE, ELDER JD, Jr, DRIPPS RD. Reflex circulatory responses to direct laryngoscopy and tracheal intubation performed during general anesthesia.Anesthesiology. 1951 Sep;12(5):556–566.

[5] Yushi U, Maiko S, Hideyuki H. Fentanyl attenuates the haemodynamic response to endotracheal intubation more than the response to laryngoscopy. Anesth Analg 2002;95:233-7.

[6] Kindler CH, Schumacher PG, Orwyler A. Effects of intravenous lidocaine and/or esmolol on haemodynamic response to laryngoscopy and intubation: a double blind, controlled clinical trial. J Clin Anesth 1996;8:491-6.

[7] Dahlgreen N,Messeter K. Treatment of the stress response to laryngoscopy and intubation with Fentanyl. Anaesthesia.1981;36:1022.

[8] Trariq S, Aziz A, Wahid A. Attenuation of hemodynamic response to intubation with Esmolol. 3 rd ed. Saca Congress Karachi,1997.

[9] Martin DE, Rosenberg H, Aukburg SJ, Bartkowski RR, Edwards MW Jr, Greenhow DE, et al. Low-dose fentanyl blunts circulatory responses to tracheal intubation. Anesth Analg 1982;61:680-4

[10] Ebert JP, Pearson JD, Gelman S, Harris C, Bradley EL. Circulatory responses to laryngoscopy:The comparative effects of placebo, fentanyl, and esmolol. Can J Anaesth 1989;36:301-6.

[11] Prys-Roberts C, Foex P, Biro GP. Studies of anaesthesia in relation to hypertension versus adrenergic β receptor blockade. British Journal of Anaesthesia. 1973;45:671-80.

[12] McCammon RL, Hilgenberg JC, Stoelting RK. Effect of Propranolol on circulatory responses to induction of diazepam- nitrous oxide anesthesia and to endotracheal intubation. Anesthesia analgesia, 1981 Aug; 60(8): 579-83.