Original Research Article

Indian Journal of Anesthesia and Analgesia
2019; 6(3) (Part - II): 869-877
DOI: http://dx.doi.org/10.21088/ijaa.2349.8471.6319.25

A Comparative Clinical Study of Attenuation of the Pressor Response to Laryngoscopy and Intubation with Intravenous Fentanyl and Intravenous Butorphanol

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Abstract

Introduction: Rapid smooth induction, rapid recovery, perioperative hemodynamic stability, minimum post-operative pulmonary complications and effective analgesia intra-operatively and post-operatively are the main aspects of general anesthesia. *Aim:* To compare the attenuation of the pressor response to laryngoscopy and intubation with intravenous Fentanyl 2 mcg/kg and intravenous Butorphanol 40 mcg/kg. *Materials and Methods:* It is a randomized prospective comparative study comparing the two opioiddrugs. The patients were then randomly assigned into two groups of 30 each in Group F and Group B received Inj. Fentanyl 2 mcg/kg IV and Inj. Butorphanol 40 mcg/kg respectively. *Results:* There was no statistical significance between the Two groups (B / F) when the demographic parameters like age distribution (36.03 ± 7.73/36.23 ± 6.80), sex distribution (15/15 vs 16/14), weight (65.5 ± 7.72/66.63 ± 5.81) were compared. The comparison of parameters like pre operative pulse rate, systolic blood pressure, diastolic pressure, mean arterial pressure, rate pressure product, respiratory rate and sedation score was also found to be statistically insignificant between the two groups. Both the Butorphanol group and the Fentanyl group was comparable with respect to events of intra operative hypotension and intra operative Bradycardia. There was no significantly respiratory depression post extubation in both the groups. We observed that the post extubation sedation score was significantly higher with the Butorphanol group than with the Fentanyl group. A favourable side effect profile was observed with the Butorphanol group than with Fentanyl group with respect to the occurrence of post-operative shivering whilethe incidence of post-operative nausea and vomiting was similar between the groups. *Conclusion:* Intravenous Butorphanol prior to induction of anaesthesia helps in better attenuation of the hemodynamic response to laryngoscopy and intubation than intravenous Fentanyl. We conclude that Butorphanol could be an effective alternative to Fentanyl for attenuation of the hemodynamic stress response to laryngoscopy and intubation.

Keywords: Laryngoscopy; Intubation; Fentanyl; Butorphanol

How to cite this article:

Hemnath Babu Kotla, Pradeep Kumar Das. A Comparative Clinical Study of Attenuation of the Pressor Response to Laryngoscopy and Intubation with Intravenous Fentanyl and Intravenous Butorphanol. Indian J Anesth Analg. 2019;6(3):869-877.

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Received on 22.03.2019, **Accepted on** 04.05.2019

Introduction

With the advent of newer drugs, the practice of anesthesia has revolutionized. Rapid smooth induction, rapid recovery, perioperative hemodynamic stability, minimum post-operative pulmonary complications and effective analgesia intra-operatively and post-operatively are the main aspects of general anesthesia. Laryngoscopy and intubation are noxious stimuli. The change in hemodynamics that arise from manipulation of the airway are attributed to the sympathoadrenal discharge that occurs as a result of stimulation of the epipharyngeal and parapharyngeal regions. This reflex increase in sympathetic activity may result in hypertension, tachycardia, and arrhythmia. A change in plasma catecholamine concentrations also has been demonstrated to be a part of the stress response to tracheal intubation. Various pharmacological methods are aimed at efferent, afferent or both limbs of response. It involves the use of inhalation agents, lignocaine, opiods, sodium nitroprusside, nitroglycerine, calcium channel blockers, adrenergic blockers.

The non-pharmacological methods aim at smooth and gentle intubation with a shorter duration of laryngoscopy. Insertion of LMA in place of endotracheal intubation blocking of the glossopharyngeal nerve and the superior laryngeal nerves. Since none of the above agents have proven to be the best choice to attenuate this pressor response the quest for the ideal agent still continue. Nevertheless opioids have been employed for this purpose for quite a long time and have proved to be extremely useful. Both the Fentanyl and Butorphanol group has haemodynamic stability, analgesia, sedation and decreases the requirement of other anesthetic drugs and are available at low cost. In this study we decided to compare the effects of the commonly used opioid Fentanyl with another opioid drug Butorphanol in attenuating the pressor responses to laryngoscopy and intubation.

Aims and Objectives

To compare the attenuation of the pressor response to laryngoscopy and intubation with intravenous Fentanyl 2 mcg/kg and intravenous Butorphanol 40 mcg/kg.

Materials and Methods

This is a randomized prospective comparative study comparing the two opioid drugs Fentanyl and Butorphanol conducted in the Department of Anesthesiology at Gandhi Hospital, Secunderabad and over a period of one year. This study includes 60 patients of ASA class I of either sex aged from 20 to 49 years scheduled for various elective surgeries under anaesthesia. All of them will require orotracheal intubation as part of their anaesthetic management and written informed consent was obtained to participate in the study.

Sample size

A sample size of 30 patients each, randomly allocated into two groups, using computerized randomization. The sample size was calculated based on the previous studies 73 Sample size calculation formulae.

The estimated sample size with an alpha-error of 0.05 and power of 80% for equivalence of groups, by substituting mean difference and standard deviation into the above formula was 21 in each group. Assuming 25% as loss to follow up in each group, we selected 30 patients in each group.

Inclusion Criteria: ASA class I with 20 to 49 years of both sexes posted for elective procedure under general anaesthesia with MP grade class I and II airway.

Exclusion Criteria: Valvular heart disease, Ischemic heart disease, Hypertension, Endocrine disorder, Metabolic disorders, Respiratory disease, Anaemic patients, Allergic diathesis, Unanticipated difficult airway.

This study was designed to study the difference between the two drugs Fentanyl and Butorphanol in attenuating the response to laryngoscopy and intubation. These two drugs were compared in terms of their effects on heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure and rate pressure product. The influence of the drugs on the post extubation respiratory rate and sedation level was also recorded.

All patients were assessed pre operatively by history, physical examination routine laboratory tests, CXR and ECG. A pre-operative visit was made to allay the anxiety and to develop a good rapport. The Patients were instructed to fast overnight and aspiration prophylaxis was advised with Tab. Pantop 40mg on the day before surgery. On the day of surgery the patients were examined in the pre-operative room and the pulse rate(PR), systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial pressure (MAP) will be recorded as first pre-operative value (pre op

1). The patients were randomly allocated into two study groups of 30 patients each, using a sealed envelope technique into Group F and Group B.

On arrival in the operating room a 20 gauge intravenous cannula was placed and crystalloid infusion was started. Patients were monitored with a non invasive monitor throughout the study period. The parameters that were monitored include heart rate, blood pressure, oxygen saturation and ECG. All patients in two groups received Inj. Midazolam 0.05 mg/kg IV were given as premedication on arrival in the operating room. Thirty minutes later the heart rate, blood pressure and mean arterial pressure were recorded for all patients and noted as the pre op value (pre op 2). This value was taken as the baseline value for comparison of the different parameters at various time intervals. At this time point the respiratory rate and the sedation level of all the patients was also assessed and recorded (RR P1 and SS P1). The degree of sedation (Sedation Score 74) is graded as follows.

0- Patient awake and talkative

1- Patient awake but uncommunicative

2- Patient drowsy, quiet and easily arousable

3- Patient asleep

An anaesthesiologist who is not involved in the study administered the test drugs in a double-blinded fashion, before induction of anaesthesia. Patients in Group F and Group B received Inj. Fentanyl 2 mcg/kg IV and Inj. Butorphanol 40 mcg/kg respectively. The HR, SBP, DBP, MAP was measured for five minutes after the administration of the test drug and the fifth minute value was recorded as pre induction value (PI). Occurrence of any hemodynamic variability was observed for duration of five minutes.

All patients were induced with Thiopentone sodium 5-6 mg/kg IV till the loss of eyelid reflexes and Inj. Vecuronium 0.1 mg/kg IV was given to achieve muscle relaxation. Controlled positive pressure ventilation was done with 100% oxygen using bag and mask. A direct laryngoscopy was done 3 minutes after the injection of the muscle relaxant and the patients were intubated with appropriate size cuffed ETT. Intubation was done by same person for all the patients, who has experience in anaesthesia for 10 years. All patients who strained or took more than 15 seconds of laryngoscopy or required a second attempt of laryngoscopy were not included in statistical analysis. No surgical stimulation is allowed for the first 10 minutes after intubation.

HR, BP were recorded at the first, second, third, fourth, fifth and tenth minute following intubation and was recorded as T1,T2,T3,T4,T5 and T10 respectively. Intraoperatively the HR, BP, oxygen saturation, ECG was continuously monitored in all the patients. They were ventilated with IPPV to maintain $ETCO_2$ value of 35 mm - 40 mm Hg and anaesthesia was maintained with 50% oxygen, 50% nitrous oxide, Isoflurane (1%), intermittent inj. vecuronium bromide (0.02 mg/kg) IV and analgesia by intermittent doses of Fentanyl 1-2 mcg/kg, Inj. Diclofenac Sodium 75 mg IV was given to all patients. Inj. Ondansetron 0.1 mg/kg IV was given 30 min before extubation to all patients. After completion of surgery neuromuscular blockade was reversed with Inj.Neostigmine 0.05 mg/kg IV and Inj. Glycopyrrolate 0.01 mg/kg IV. Patients were extubated after thorough oral suctioning. The RR and sedation level five minutes after extubation was recorded (RR P2, SS P2 respectively). Patients in whom the surgical procedure lasted for more than 3 hours were excluded from the statistical analysis. The patients were then shifted to the recovery room and observed every 2 hours for upto 24 hours. The occurrence of postoperative nausea and vomiting and the postoperative shivering was observed in both the study groups upto two hours post extubation.

Postoperative nausea was measured on VAS scale (0-10) while emetic episode was defined as a single vomiting or retching event or any combination of these events separated by less than 2 mins. inj Ondansetron 4 mg IV was given as rescue antiemetic. The post-operative shivering was graded as follows.

Grade 0 = no shivering.

Grade 1 = mild fasciculation of face or neck and electrocardiogram disturbances in the absence of voluntary activity of the arms.

Grade 2 = visible tremor involving more than one muscle group.

Grade 3 = gross muscle activity involving whole body.

Oxygen through venturi mask was given to all patients with shivering. Injection Pethidine 0.25 mg/kg IV was given for grade 2 or 3 shivering.

Statistical analysis for intra and inter-group was carried out by paired t-test and unpaired t-test respectively. The software used for analysis of the data was Statistical package for Social Science (SPSS) package. A p – value of less than 0.05 will be considered to be statistically significant.

Results

No significant difference was observed in sex wise distribution of the cases between the two groups (p>0.05). Overall frequency distribution in both the groups 51.67% males and 48.33% females. The mean values of the age with standard deviations are 36.06 ± 7.73 for group B and 36.23 ± 6.80 for group F. There was no significant difference between the two groups (p>0.05).

In the group B, the mean weight was 65.5 ± 7.72. In Group F the mean weight was 66.63 ± 5.81. No statistical significant difference was observed in the weight distribution in two groups (p>0.05).

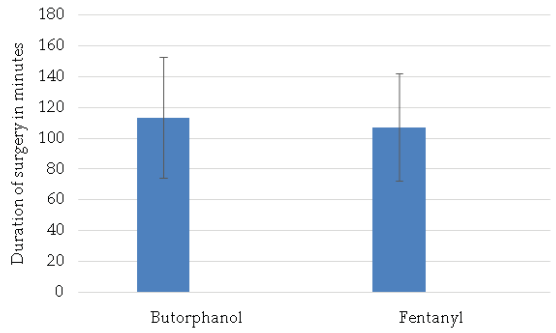

Fig. 1: Comparison of duration of surgery between two groups

In the group B, the mean duration (in minutes) was 113.5 ± 39.5 In Group F the mean duration (in minutes) was 107.3 ± 35.8. No statistical significant difference was observed in the duration of surgery between two groups (p>0.05).

Table 1: Comparison of pre operative baseline parameters (pre op 2)

Parameter	Group B	Group F	p value
Pre op 2 HR	80 ± 5.14	77.67 ± 4.95	0.2846
Pre op 2 SBP	120.96 ± 6.36	122.03 ± 4.99	0.2365
Pre op 2 DBP	79.83 ± 5.83	80.73 ± 3.44	0.235
Pre op 2 MAP	92.94 ± 5.52	94.5 ± 2.40	0.082

The pre-operative 2 (pre op 2) heart rate, systolic and diastolic blood pressures, mean arterial pressure is comparable between the two groups.

Heart rate was significantly higher at T1,T2,T3 when compared to the baseline and significantly lower when compared to the baseline values at other time intervals (T4,T5,T10) (Table 2).

The heart rate was significantly higher at T1, T2, T3 when compared to the baseline and significantly lower when compared to the baseline values at other time intervals (T5,T10).

The Mean Arterial Pressure was significantly higher at T1, T2, T3 when compared to the baseline and significantly lower when compared to the baseline values at other time intervals (T4, T5, T10) (Table 3).

The rate pressure product is significantly lower in group B when compared to group F from the

Table 2: Comparison of Heart Rate between two Groups

Time	Groups	No.	Mean	S.D	% change wrt baseline	T value	p value
Pre op 1	B	30	81.4	4.65	1.75	0.837	0.4
	F	30	80.4	4.59	1.43		
Baseline	B	30	80	5.14	0	0.572	0.56
	F	30	79.26	4.95	0		
Pre Induction	B	30	77.13	5.30	3.58-	0.182	0.85
	F	30	76,1	4.63	2.96-		
T1	B	30	88.93	4.63	11.16	0.826	0.412
	F	30	89.8	3.40	13.2		
T2	B	30	84.73	4.97	5.91	2.74	0.005
	F	30	87.86	3.03	10.84		
T3	B	30	80.86	5.17	1.08	3.48	0.001
	F	30	84.7	3.09	6.85		
T4	B	30	77	5.38	3.75-	3.86	0.001
	F	30	81.3	2.94	2.6		
T5	B	30	73.06	4.4	8.66-	4.91	0.001
	F	30	77.63	2.55	2.06-		
T10	B	30	68.13	2.72	14.83-	5.72	0.001
	F	30	71.9	2.39	9.29		

p value < 0.05 significant

second minute after intubation. At T1, both the groups showed increase in the rate pressure product which wasnot statistically significant. At T2 & T3, there was significant increase in the rate pressure product in Fentanyl group when compared to Butorphanol group ($p<0.05$). At T4, T5 & T10 there was significant reduction in the rate pressure product in Butorphanol group when compared to Fentanyl group which was highly significant ($p<0.001$) (Table 4).

Table 3: Comparison of MAP between two Groups

Time	Groups	No	Mean ± S.D	% change wrt baseline	t value	p value
Mean pre op 1	B	30	95.07 ± 5.02	1.627	0.373	0.711
	F	30	65.44 ± 2.35	0.99		
Baseline	B	30	92.94 ± 5.52	0.000	0.879	0.383
	F	30	94.5 ± 2.40	0		
Mean PI	B	30	90.9 ± 4.83	3.041-	2.019	0.048
	F	30	92.73 ± 2.45	1.90-		
Mean T1	B	30	100.4 ± 4.19	7.115	3.752	0.001
	F	30	103.31 ± 1.52	9.32		
Mean T2	B	30	96.67 ± 4.07	3.338	5.994	0.001
	F	30	101.62 ± 1.68	7.44		
Mean T3	B	30	93.41 ± 4.60	0.166-	6.126	0.001
	F	30	98.86 ± 1.71	4.62		
Mean T4	B	30	90.14 ± 4.27	3.635-	8.048	0.001
	F	30	96.82 ± 1.53	2.45		
Mean T5	B	30	86.89 ± 4.02	7.115-	8.674	0.001
	F	30	93.71 ± 154	0.835-		
Mean T10	B	30	80.41 ± 15.54	10.904-	8.187	0.002
	F	30	89.22 ± 1.90	5.58-		

p value < 0.05 significant;

Table 4: Comparison of Rate Pressure Product between two Groups

Time	Groups	No.	Mean ± S.D	% change wrt baseline	t value	p value
Mean pre op 1	B	30	9988.03 ± 913.21	3.03917	0.196	0.845
	F	30	9943.67 ± 855.9	2.6700		
Baseline	B	30	9550.96 ± 1002.83	0	0.035	0.972
	F	30	9489.9 ± 855.9	0		
Mean PI	B	30	9124 ± 945.37	6.39436-	0.402	0.689
	F	30	8909.7 ± 1487.18	5.3791-		
Mean T1	B	30	11459.1 ± 888.94	18.2150	1.288	0.203
	F	30	11706.83 ± 564.61	20.875		
Mean T2	B	30	10657.6 ± 962.02	9.94659	3.040	0.004
	F	30	11278.43 ± 496.34	16.195		
Mean T3	B	30	9915.96 ± 1023.89	2.29571	2.991	0.004
	F	30	10546.27 ± 533.07	8.892		
Mean T4	B	30	9237.56 ± 1008.60	4.70284-	3.097	0.003
	F	30	9864.73 ± 461.28	1.8551		
Mean T5	B	30	8553.96 ± 836.23	11.755-	3.480	0.001
	F	30	9140.26 ± 389.94	5.6252-		
Mean T10	B	30	7400.67 ± 1525.76	21.0723-	3.856	0.0065
	F	30	8127.63 ± 289.26	16.081-		

p value < 0.05 significant

Table 5: Comparison of Respiratory Rate and Sedation Scorebetween two Groups

Respiratory Rate	Group B	Group F	p value between B and F
P1	11.467 ± 0.9732	11.533 ± 1.041	0.3993
P2	12.4 ± 1.734	12.2 ± 0.8469	0.2862
	Sedation Score		
P1	1	1	NA
P2	2.3 ± 0.46	1.2 ± 0.40	<0.001

p value < 0.05 significant

Table 6: Intra and post Operative variables distribution between two Groups

Group	Intraoperative Hypotension		Total	P value between B and F
	Yes	No		
Group B No. of patients % within Group	3 10%	27 90%	30 100.0%	0.1869
Group F No. of patients % within Group	2 6.7%	28 93.3%	30 100.0%	
Total No. of patients % of study population	5 8.3%	55 91.7%	60 100.0%	
Intra Operative Bradycardia				
Group B No. of patients % within Group	3 10%	27 90%	30 100%	0.259
Group F No. of patients % within Group	1 3.3%	29 96.7%	30 100.0%	
Total No. of patients % of study population	4 6.7%	56 93.3%	60 100%	
Intra Operative Shivering				
Group B No. of patients % within Group	2 6.7%	28 93.3%	30 100.0%	0.0051
Group F No. of patients % within Group	6 20%	24 80%	30 100.0%	
Total No. of patients % of study population	8 13.3%	52 86.7%	60 100.0%	
Post Operative Nausea and Vomiting				
Group B No. of patients % within Group	5 16.7%	25 83.3%	30 100.0%	0.1704
Group F No. of patients % within Group	6 20%	24 80%	30 100.0%	
Total No. of patients % of study population	11 18.3%	49 81.7%	60 100.0%	

*p value: 0.1869

There is no significant difference between the groups B and F with regard tothe pre-operative and post extubation respiratory rate. While the sedation score was zero in both the groups pre operatively, the post extubation sedation score in Butorphanol group was 2.3 ± 0.46 and in Fentanyl group was 1.2 ± 0.4, which was significantly higher in group B than in group F (p<0.001) (Table 5).

In Butorphanol group, intra operative hypotension was observed in 3 patients (10%) and in Fentanyl group, intra operative hypotension was observed in 2 patients (6.7%). There is no significant difference in the occurrence of intra operative hypotension, Bradycardia in between the two groups (p >0.05). The incidence of post operative shivering is significantly more with the Fentanyl group than the Butorphanol group (p<0.005) (Table 6).

Discussion

The purpose of conducting this study in healthy patients was to generate datato be used in a future study in those with a history or risks of coronary artery disease with ST – T monitoring in whom beneficial effects of Butorphanol and Fentanyl arelikely to out weigh adverse effects. Fentanyl has been tried in various bolus doses for control of hemodynamic changes of laryngoscopy. Kay et al. [3] found complete attenuation of hemodynamic response with 5 µg/kg Fentanyl. But this occurred at the cost of a significant decrease in blood pressure and heart rate and increase in respiratory depression. In clinical practice sympathetic reflexes resulting from surgical stimulation might maskany hypotensive, vagotonic respiratory effects of low dose fentanyl respiratory effects of low dose fentanyl.

McClain et al. [4] reported apnoeic episodes in four out of seven patients who received 3.2 to 6 µg/kg Fentanyl. Hence low dose Fentanyl (2 µ/kg) was used in the presentstudy. In the current study, the selection of dosages were based on the assumption that Butorphanol is equipotent to morphine. Fentanyl on an mg basis is about 80 times more potent than morphine and a dose of 2 µg/kg was therefore chosen to bealmost equipotent to

Butorphanol 40 mcg/kg. In the current study, dose of Butorphanol 40 mcg/kg was used because larger doses might have improved thequality of anaesthesia.

In the present study, there was no statistically significant difference in the distribution of age, sex and weight of patients and duration of surgery in both the groups. Variation of HR decrease with increasing age. Young patients show more extreme changes. Marked fluctuations in hemodynamic response are often seen ingeriatric patient. 87 In our study, we selected an optimal age range of 20 to 49 years.

The mean age in our study was 36.06 ± 7.73 for group B and 36.2 ± 6.80 for group F. There was no difference in the cardiovascular parameters at baseline in our study. A variable combination of drugs used for premedication, induction, relaxation and maintenance of anaesthesia can influence the sympathetic response tolaryngoscopy and intubation.

Mean Arterial Pressure

The mean arterial pressure which is a derived value is important for the maintenance of the auto regulatory functions of the heart, brain and kidney.

Forbes and Dally [5] observed that during induction of anaesthesia with thiopentone, suxamethonium and endotracheal intubation, normotensive patients showed a highly significant MAP (25 mmHg, S.E 2.2, range 2-45) with in 1 min of laryngotracheal stimulation which is explained on the basis of a reflex sympathetic response to a mechanical stimulation of larynx and trachea. Similarly in this study, in Group B at 1 min after laryngoscopy and intubation, a 7.11% increase in the MAP was observed with mean values of 100.4 ± 4.19 and then decreased with mean value of 96.67 ±4.7 at 2 minute subsequently and was statistically significant. A decrease trend in MAP was noted from 2 min to 10 min after laryngoscopy and intubation. The mean baseline MAP in this group was 94.5 ± 2.40. At 1 minute after laryngoscopy and intubation, 9.32% increase in the mean MAP was observed with mean values of 103.31 ± 1.52 which was further decreased to 101.62 ± 1.68 at 2 minute subsequently, a decreasing trend in MAP was noted starting from 2 min to 10 min after laryngoscopy. The MAP was significantly higher at T1, T2, T3, T4 when compared to the baseline and significantly lower when compared to the baseline value at other time intervals. At T1, T2, T3 both groups showed increase in MAP which was statistically significant ($p<0.001$). At T4, T5, T10 there was significant reduction in the mean arterial pressure in B group when compared to F group which was $p<0.05$.

Heart Rate

Pandit and colleagues [6] measured perioperative vital signs during laparoscopy using Butorphanol and fentanyl. They found that the patients who received Butorphanol experienced smaller increases in HR and SBP two mins after intubation which was in correlation with the present study. At T2 & T3, patients experienced smaller increases in the HR and SBP which was statistically significant ($p <0.05$). In the present study at T1, both the groups showed increase in the heart rate which was not statistically significant. At T2, T3, there was significant increase in the HR in F group when compared to B group ($p<0.05$). At T4, T5 & T10 there was significant reduction in the heart rate in B group when compared to F group which was highly significant ($p<0.001$).

Rate Pressure Product (RPP)

RPP also known as cardiovascular product is a measure of the stress put on the cardiac muscle based on the number of times it needs to beat per minute (HR) and the arterial BP that it is pumping against (SBP). It will be a direct demand of the heart and thus a good measure of the energy consumption of the heart. It allows youto calculate the internal work load or haemodynamic response. In a similar study conducted by Balasubramaniam S et al. [7] the RPP is significantly lower in Group B when compared to Group F from the 2nd min after intubation. The RPP in Group B after intubation becomes comparable to the preoperative RPP at the 4th min after intubation and it becomes significantly lower than the preoperative RPP from the 5th min after intubation. The RPP in Group Fafter intubation becomes comparable to the preoperative RPP at the 5th min after intubation and it becomes significantly lower than the preoperative RPP at 10th min after intubation. The RPP in both the groups increased following intubation. However the increase was significantly lower in the B group when compared to the F group. A rise of RPP by 18.2% was observed in B group as compared to 20.8% in F group. At T1, both the groups showed increase in the RPP which was not statistically significant.

At T2 & T3, there was significant increase in the RPP in F group when compared to B group ($p<0.05$). At T4, T5 & T10 there was significant reduction in the RPP in B group when compared

to F group which was highly significant (p <0.001). Intraoperative Hypotension: The occurrence of intraoperative hypotension was 10% and 6.7% in the B and F groups respectively, was not found to be significant between the two groups (p > 0.05). Intraoperative Bradycardia: The occurrence of intraoperative Bradycardia was 10% and 3.3 % in the B and F groups respectively, was not found to be significant between the two groups (p > 0.05).

Philip BK et al. [8] in their study comparing these two drugs also found the maintenance phase of anaesthesia to be uneventful in both the groups. In the present study, both the drugs provided stable hemodynamics throughout the intraoperative period.

Philp et al. [8] in their study found that there was no significant difference with regard to post operative respiratory depression both the groups which was incorrelation to present study.

Postoperative sedation was the most prominent side effect observed in the patients who received Butorphanol. The sedation score was significantly lower in the Fentanyl group (p<0.001). This finding is similar to that observed by Arora et al. [9] and Pandit et al. [6] PONV not only lead to patient discomfort but rarely can cause pulmonary aspiration when patients are recovering from the effects of anaesthetic drugs. Postoperative nausea and vomiting is one of the frequent side effects observed with opioids whether they are used in the intra operative or postoperative period [10]. The dose of the opioid used is of significance rather than the type of opioid in causing postoperative nausea and vomiting. Arora et al. [9] Observed that PONV was 18% in Fentanyl group and 12% in Butorphanol group which was statistically not significant. In ourstudy postoperative nausea and vomiting occurred in 16.7% of patients in the Butorphanol group and in 20% of percentage of patients in the Fentanyl group. Neither group was superior to the other with regard to the incidence of post operative nausea and vomiting (p >0.05).

Post anaesthesia shivering is another complication which can occur in 5-65% of patients in recovery period depending on age, sex, anaesthetic agent used forinduction and maintenance of anaesthesia and duration of surgery. Shivering notonly causes physical discomfort but also causes precipitous rise in oxygen consumption which may be poorly tolerated by a patient with diminished cardiorespiratory reserve. Arora et al. [9] Showed that post operative shivering was more in Fentanyl group when compared to Butorphanol group which was statistically significant. In the present study, the incidence of postoperative shivering was significantly less in the Butorphanol group (6.7%) when compared to the Fentanyl group (20%) (p <0.005). Both Butorphanol and Fentanyl effectively attenuates the hemodynamic response to laryngoscopy and intubation of trachea. Of the two, Butorphanol is effective in attenuation compared to Fentanyl.

Conclusion

With this study we conclude that administration of intravenous Butorphanolprior to induction of anaesthesia helps in better attenuation of the hemodynamic response to laryngoscopy and intubation than intravenous Fentanyl. Neither of the drugs was associated with any adverse hemodynamic events. Hence, we conclude that Butorphanol could be an effective alternative to Fentanyl for attenuation of the hemodynamic stress response to laryngoscopy and intubation.

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