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COMPARE THE EFFICACY OF BUTORPHANOL WITH CONVENTIONAL OPIOIDS IN PATIENTS UNDERGOING SPINAL SURGERIES UNDER GENERAL ANAESTHESIA

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ABSTRACT

Background: Prevention of stress injury by maintaining stable haemodynamic pressure is the corner stone of anaesthesia management. Fentanyl, Morphine and Pethidene are the most common agent used for attenuation of presser response in healthy patients during intubation. Butorphanol is a drug having cardiac stable with minimal respiratory effects which has not been studied as premedication drug.

Methods: Three groups A, B and C received either Morphine 0.1mg/kg, Pethidene 0.5mg/kg or Butorphanol 35- 40 μgm/kg for induction respectively. Various haemodynamic parameters were recorded at baseline than 1, 5 and 10 minute post intubation.

Results: The haemodynamic parameters were higher in immediate post intubation period in A and B groups. No difference seen in postoperative complication among three groups

Conclusion: Butorphanol confers better haemodynamic stability as compared to conventional premedication drugs for intubation.

KEYWORDS : Butorphanol, Pethidene, Morphine

INTRODUCTION

Since the dawn of use of analgesic agents during induction in general anaesthesia (GA), no ideal analgesic agent has yet been discovered in terms of providing perioperative comfort and stability to patients in perioperative period. Over the years, a major objective of analgesic research has been to find such an agent which retains the desirable analgesic property of commonly used agent, however shows no liability of producing physical dependence. [1, 2]

Butorphanol is a synthetic opioid with analgesic potency greater than morphine, and narcotic antagonist activity equivalent to nalorphine, also with a desirable low level of physical dependence. [3] Unlike morphine and pethidine, Butorphanol has relatively minimal effects on cardiovascular and respiratory system and has been accepted as a desirable drug for clinical usage. These properties make Butorphanol a desirable analgesic agent worldwide. [4]

An ideal anaesthetic agent is the one that possesses low toxicity and the ability to produce amnesia and analgesia with minimum undesirable side effects. Keeping these considerations in mind, we undertook a study to compare Butorphanol with conventional opioids (Morphine and Pethidine) in patients undergoing spinal surgeries under general anaesthesia. The primary objective of the study is to measure pressor response, analgesia requirement and postoperative complications along with recovery time.

MATERIAL AND METHODS

After Institutional Ethical Committee approval, 75 patients of American Society of Anesthesiologists (ASA) physical status I or II of either sex, less than 65 years of age planned for elective spinal surgery (laminectomy, microdisectomy, plate fixation and disc replacement) were enrolled into this randomized, double-blind study. Patients addicted to opioids, history of obstructive sleep apnea, asthma, hypertension, on Beta blocker drug and thyroid disease were excluded from the study. After shifting the patient to the operating room, standard monitors were attached and baseline values of heart rate (HR), blood pressure (BP) and oxygen saturation (SpO_2) were noted. All patients were pre-medicated with Inj. Midazolam 0.03 mL/ kg IV 5 minutes prior to induction. According to a computer-generated randomization chart, the patients were assigned to one of the three treatment groups. To ensure blinding, anaesthesia was induced by anaesthesiologists who were not involved in the study. Patients in group "A" received IV Morphine 0.1 mg/kg, patients in group "B" received IV Pethidine 0.5 mg/kg and patient in Group "C" received Butorphanol 35- 40 μgm/kg just before induction agent. The test drug was prepared and administered by a nurse who was blinded to drug assignment. Any of the three drugs was taken in a 10 ml syringe and labeled as 'TEST DRUG'. Tracheal intubation was facilitated by using Inj Vecuronium 0.1 mg kg^{-1} IV and GA was maintained with O_2, N_2O and Sevoflurane. Monitoring of HR, Blood pressure (BP) and SpO2 was done as baseline, at 1, 5 and 10 min after the intubation. All patients were given Inj Ondansetron 0.15mg/ kg IV 30 min prior to extubation. Residual neuromuscular blockade was reversed with Inj Neostigmine 0.05mg kg^{-1} IV and Inj Glycopyrrolate 0.008mg kg^{-1} IV. Patient was extubated after adequate recovery of muscle power and patient was monitored post operatively for nausea and vomiting as per verbal rating scale (VRS). Arterial gas analysis (ABG) was done after patient was fully reversed and before sending to post-op room. In post-op room patient was monitored for HR, SPO_2 and BP, and recovery time was recorded (from time of reversal to patient responding to verbal commands). Incidence of nausea vomiting, hallucinations, dysphoria and awareness following anaesthesia were recorded in post-op period. Pressure response is considered significant if BP increase ≥ 10 mmHg. The second dose of opioid was administered in postoperative ward at the time of requirement.

Data analysis was done by using SPSS. The statistical technique used was one-way analysis of variance (ANOVA) followed by multiple comparisons among groups by Bonferroni method. The comparison over period of time was carried out by using two ways ANOVA (Repeated measure

analysis) along with multiple comparisons by Bonferroni method over the time for significant group. Analysis for categorical variable done by Chi square test. The significance was observed if $p < 0.05$.

RESULTS

Demographic parameters and clinical characteristics were comparable between the groups. Most of patient in ASA grade I. There was no significant difference among the groups as surgery and anaesthesia time is concerned. (Table 1)

In group A, HR at 1 min and 5 min after intubation was higher than baseline ($p<0.082$ and $p<1$). In group B, HR at 1 min and 5 min after intubation was higher than baseline ($p < 0.001$ and $p < 0.001$). In group C, HR at 1 min after intubation was lower than baseline ($p<1.0$) but HR at 5 min and 10 min after intubation were significantly lower ($p < 0.01$ and $p < 0.01$ respectively) as compared to baseline. After 1, 5 and 10 minute of intubation, HR in group B was higher than group A and C ($P< 0.05$). (Table 2)

At 1 minute after intubation, SBP there was no significant difference between group A and group B ($p < 0.173$) but there was significant increase in SBP ($p < 0.023$ i.e. $p < 0.05$) in group B as compared to group C. Similarly at 5 min after intubation, there was no significant difference between group A and B and group A and group C but BP is significantly increased in group B when compared to group C. (Table 2)

It was observed that 2nd dose of morphine was required about 231.6 min after 1st dose and in case of pethidine it was 173.6 min and in Butorphanol 286.2 min. There is no difference in pH value preoperatively and postoperatively in group A, B and C (7.42 ± 0.05, 7.43 ± 0.03, 7.42 ± 0.05 vs. 7.36 ± 0.05, 7.36 ± 0.02, 7.34 ± 0.03) respectively. It was seen that there was decrease in pH in all 3 groups highest being in group C and lowest being in group A, but difference between all three groups was statistically insignificant. There is no difference in pCO2 value preoperatively and postoperatively in group A, B and C (33.1 ± 4.4, 33.8 ± 4.8, 35.3 ± 4.3 vs. 39.1 ± 5.1, 40.9 ± 4.4, 43.2 ± 4.9) respectively. It was observed that there was increase in $PaCO_2$ in all three group highest being on group C and lowest being in group A but increase in $PaCO_2$ in all three groups was statistically insignificant. There is no difference in pCO2 value preoperatively and postoperatively in group A, B and C (33.1 ± 4.4, 33.8 ± 4.8, 35.3 ± 4.3 vs. 39.1 ± 5.1, 40.9 ± 4.4, 43.2 ± 4.9) respectively.

Table 1. Demographic profile and baseline clinical characteristics of patients in groups. [MEAN ± 2SD], M= Male, F= female

Baseline characteristics	Group A (n=25)	Group B(n=25)	Group C(n=25)	P value
Age (yrs)	42.4 ± 9.8	43.2 ± 8.7	42.0 ± 8.7	0.89
Body Weight (kg)	56.0 ± 7.6	56.5 ± 9.1	55.2 ± 6	0.83
Gender (M/F)	13/12	12/13	12/13	
ASA I/ II	19/6	17/8	18/7	
Anaesthesia Time (min)	97.2 ±14.5	97.8 ± 17.5	96.6 ± 15.4	0.96
Surgery time (min)	73.4 ± 13.8	72.8 ± 14.9	72.2 ± 12.6	0.95

Table -2 Haemodynamic parameter at different interval of time [MEAN ± 2SD], HR= Heart rate, SBP= Systolic Blood Pressure

Para meter	Group	Base line	1 min after induction	5 min after induction	10 mins after induction
HR	A	83.6 ±10.3	88.1 ± 15.2	83.7 ±11.1	81.9 ± 11.4
	B	87.6 ± 8.9	104.7± 12.3	98.4 ± 8.3	92.7 ± 7.2
	C	90.2 ± 13.3	88.8 ±16.2	83.7 ± 13.0	82.7 ± 11.6
	P value	0.10	0.001	0.001	0.001
SBP	A	119.4 ± 8	122.3 ±21	117.1± 13.8	116.4 ±8.3
	B	125.2 ±11.2	132.4 ±18	124.4±11.8	123.1 ±8.1
	C	120.6 ± 9.6	118 ±16.5	115.1±13	113.6 ±9.8
	P value	0.08	0.02	0.03	0.001

Table 3. Showing postoperative complication among the groups, PONV- Postoperative nausea and vomiting.

	Group A	Group B	Group C
Pressor response	5	7	2
PONV	4	4	3
Hallucinations	0	0	0
Dysphoria	0	0	1
Recall of surgical procedures	0	0	0
Intraoperative arrhythmias	0	1	0
Immediate post operative pain	0	1	0

DISCUSSION

Literature revealed that Butorphanol tartrate, a mixed agonist-antagonist opioid in the dose of 35- 40 μgm/kg IV is safe, potent and effective analgesic agent. [4] It is an acceptable alternative to morphine and pethidene as an analgesic with greater analgesic efficacy and low incidence of side effects. It also diminishes the liability of drug dependence, respiratory depression and other side effects. It does not fall under the category of controlled drug. Its use can lessen administrative liability for abuse and diminish the number of distribution records associated with schedule II narcotics.

In our study, we found that Butorphanol, Morphine and Pethidene were cardio stable. However, HR was significantly lower in Butorphanol group after intubation, and after 5 and 10 minutes of intubation. Blood Pressures also found to be lower in Butorphanol group as compared to other drugs in post intubation period. The reason probably being its earlier onset of action as analgesic drug. This shows that Butorphanol is more effective than Morphine and Pethidene in attenuating the sympathetic response to direct laryngoscopy and endotracheal intubation and in blunting the surgical stress response.

Rao satyanarayana et al [5] compared Butorphanol and fentanyl for GAin patients taken for laparoscopic surgeries. There was significant rise in BP after intubation in fentanyl group compared to Butorphanol group. Several workers have studied the use of Butorphanol as premedication for GAand also in post operative analgesia and found that Butorphanol is a safe and effective drug for use in balanced anaesthesia.

CONCLUSION

The study has shown that Butorphanol have better haemodynamic stability, longer duration of pain relief and lower incidence of side effects. The drug has shown to be an excellent choice not only for pain relief, but also in terms of perioperative tranquility it provides and high degree of acceptance by patient population.

	Contributor 1	Contributor 2	Contributor 3	Contributor 4
Concepts	√	-	√	-
Design	√	-	-	
Definition of intellectual content	√	-	√	-
Literature search	√	√	-	√
Clinical studies	√	-	-	-
Experimental studies	√	-	-	-
Data acquisition	√	-	-	-
Data analysis	√	-	-	-

Statistical analysis	-	-	-	-
Manuscript preparation	√	√	-	-
Manuscript editing	√	√	√	-
Manuscript review	√	√	√	√
Guarantor	√	√	√	-

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