Original Research Article

A comparative study of analgesic efficacy of Butorophanol and fentanyl

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Abstract

Background: More than 80% of patients who undergo surgical procedures experience acute postoperative pain. Various drugs are used along with anaesthesia to relieve postoperative pain. **Aim and objective:** To compare the analgesic efficacy of Butorophenol and Fentanyl in various surgeries **Methodology:** Present study was a prospective study carried out in patients undergoing general anaesthesia for different surgeries. Total 80 cases were divided into two groups (40 each). Group A patients received inj. butorphanol tartarate 20µg/kg intravenously prior to induction and Group B patients received inj. fentanyl citrate 1µg/kg intravenously prior to induction. Post operative Pain was assessed using Visual Analogue Scale at every 30 minutes interval for first 90 minutes. Data analysed with appropriate statistical tests. **Results and discussion:** At the end of 60 minutes the Mean VAS score was 3.200±0.217 in group A and 3.6120±0.211 in group B. This difference was statistically significant ($p<0.05$). At the end of 90 minutes Mean VAS score in Group A (3.872±0.125) was significantly lower than Group B (4.932±0.218).

Key Word: Butorophanol, fentanyl.

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INTRODUCTION

Narcotic analgesics are widely used as adjuncts to general anaesthesia. Narcotics decrease the requirement of anaesthetic agent and minimizes postoperative pain. [1]Ideal adjunct should have short duration of action and less side effects. Postoperative pain gives rise to various physiological and psychological changes in patients. Effective pain control helps in early mobilization and postoperative discharge. [2] Dr. Bernard Belleau in 1962 led to the development of non-narcotic analgesic Butorphanol. Approved for use in 1978, this compound is said to be 5-10 times more potent than morphine. Butorphanol is a agonist-antagonist opioid of phenanthrene series. It is a kappa receptor agonist as well as mu receptor antagonist.[3] Butorphanol can be given via intramuscular, intravenous or nasal route. It is extensively metabolized in liver, mainly by hydroxylation. Fentanyl, a' novel opioid analgesic was discovered by Dr. Paul Jannsen, a Belgian chemist. Pure fentanyl was toxic. Hence, another form of fentanyl was introduced as citrate salt which allows fast pain relief about 50-100 times that of morphine. [4,5] Fentanyl, a short-acting lipophilic opioid stimulates μ_1 and μ_2 receptors, it potentiates the afferent sensory blockade and facilitates reduction in the dose of local anesthetics without intensifying the motor block or prolonging recovery, fentanyl provides good quality of intraoperative analgesia, hemodynamic stability, minimal side effects, and excellent quality of postoperative analgesia.[6] Fentanyl can be given through intramuscular, intravenous, transdermal or buccal route. It is extensively metabolized in the liver producing norfentanyl. Fentanyl in different doses can be used to provide analgesia, as component of balanced anaesthesia

or surgical anaesthesia in very high doses. Very few studies were carried out to compare the analgesic efficacy of butorphanol and fentanyl so this study was conducted to campare the analgesic efficacy of both the drugs post operatively.

MATERIAL AND METHODS

Present study was a prospective study carried out in department of anaesthesia at tertiary health care center. Study population was patients undergoing general anaesthesia for different surgeries.

Inclusion criteria: 1. Physical status of ASA I and ASA II 2. Age group of 18 -55 years.

Exclusion criteria: 1. Patients with Cardiovascular diseases like hypertension,ischemic heart disease, valvular heart disease 2.patients with Respiratory diseases like asthma, pulmonary tuberculosis, COPD 3. Patients with Renal or hepatic derangement, Haematological derangements 4.Pregnant females 6.patients with History of narcotic abuse.

Study was approved by ethical committee of the institute. A valid written consent was taken from patients after explaining study to them. In our study 80 cases were divided into two groups. Group A patients received inj. butorphanol tartarate 20µg/kg intravenously prior to induction and Group B patients received inj. fentanyl citrate 1µg/kg intravenously prior to induction. Data was collected with pre tested questionnaire. Data included sociodemographic data, clinical history and through clinical examination. Pre operative assessment was done. No premedication was given except Inj. Glycopyrrolate 5 µg/kg intravenously. Vital parameters like pulse, blood pressure both systolic and diastolic, respiratory rate, oxygen saturation were measured. General anaesthesia was started with intravenous line was secured with an intracath. 3 minutes prior to induction patients were given an equianalgesic dose of Inj. Butorphanol 20µg/kg intravenously or Inj. Fentanyl 1µg/kg intravenously. Following preoxygenation for 5 minutes, general anaesthesia was induced with Inj. Thiopentone sodium 4 mg/kg intravenously. Tracheal intubation was done under direct laryngoscopic vision with adequate sized endotracheal tube facilitated by Inj. Succinyl Choline 2 mg/kg intravenously. General anaesthesia was maintained with 40% 02 :60% N20 with intermittent isoflurane. Isoflurane was given depending on the depth of anaesthesia and long acting depolarizing muscle relaxant. Inj. Vecuronium bromide 0.08 mg/kg intravenously on controlled ventilation with Bains' circuit. Vital parameters like pulse, blood pressure, oxygen saturation, were monitored just prior to induction,1 and 2 minute after induction and 1 and 3 minute after tracheal intubation and 15 minutes interval thereafter. Principal investigator made all observations. During recovery patient's activity, respiration, alertness, color was evaluated every 30 minutes for 90 minutes. Pain was assessed using Visual Analog Scale at every 30 minutes interval for first 90 minutes. Baseline visual analogue scale was assessed. Visual Analog Scale consisted of a 10 cm Scale, representing varying intensity of pain from 0 (no pain) to 10 (worst imaginable pain).

RESULTS

In our study majority of the patients were from the age group of 30-40 age group in both the groups. Mean age of the patients in Group A was 32.20 ± 1.75 years while mean age in group B was 33.74±1.32 years. Mean weight of the patients in Group A was 54.53 ± 1.03 Kgs and mean weight in Group B was 55.38±1.03 Kgs. Thus both the groups were comparable with respect to age and weight as the difference in mean age and weight is statistically not significant ($p>0.05$) (table 1)

Majority of the patients in both the groups were male. In group A out of 40 patients 27 were male and 13 were female. In Group B 24 male and 16 female were present. Both the groups were comparable with respect to sex ($p>0.05$) (table2) The mean duration of surgery of group A was 89.53 ± 2.41 minutes and the mean duration of surgery of group B was 81.17 ± 3.23 minutes. VAS score was used for analysing the analgesic efficacy of the drugs. Mean baseline VAS score in Group A was 1.214 ± 0.9 and mean baseline VAS score in Group B was 1.192 ± 0.91. Both the groups were comparable with respect to VAS score ($p>0.05$) Table 3 showed mean VAS score at the end of 30 minutes, 60 minutes and 90 minutes post operatively. At the end of 30 minutes Mean VAS score of Group A was 2.300±0.125 and that of Group B was 2.500±0.184. This difference was statistically not significant ($p>0.05$). At the end of 60 minutes the Mean VAS score was 3.200±0.217 in group A and 3.6120±0.211 in group B. This difference was statistically significant ($p<0.05$). At the end of 90 minutes when we observed the VAS score we found that Mean VAS score in Group A (3.872±0.125) was significantly lower than Group B (4.932±0.218). Thus above scores indicate that Buterophenol is more effective in analgesia than Fentanyl post operatively. Rescue analgesia was given as intramuscular Diclofenac sodium when the VAS score was ≥4. Table 4 shows no of patients who were given rescue analgesia at 30 minutes interval postoperatively. In Group A 6 patients required Rescue analgesia as compared to 12 patients in group B. at the end of 60 minutes 12 patients in Group A and 19 patients in Group B required rescue analgesia. At the end of 90 minutes 15 patients in group A and 23 patients in group B required Rescue analgesia. (table 4)

Table 1: Comparison of two study groups according to age and weight

Variables	GROUP A	GROUP B	P Value
AGE	32.20 ± 1.75	33.74±1.32	>0.05
WEIGHT	54.53 ± 1.03	55.38±1.03	>0.05

Table 2: Comparison of two study groups according to Sex

Variables	GROUP A	GROUP B	P Value
Male	27	24	51
Females	13	16	29
Total	40	40	80

Table 3: Comparison of patients of both the groups for VAS score

VAS SCORE	GROUP A	GROUP B	P value
30 minutes	2.300±0.125	2.500±0.184	>0.05
60 minutes	3.200±0.217	3.6120±0.211	<0.05
90 minutes	3.872±0.125	3.6120±0.211	<0.05

Table 4: Comparison of patients of both the groups for Rescue Analgesia

RESCUE ANALGESIA	GROUP A (no of patients)	GROUP B (no of patients)
30 MINS	06	12
60 MINS	12	19
90 MINS	15	23

DISCUSSION

Mean age of the patients in Group A was 32.20 ± 1.75 years while mean age in group B was 33.74±1.32 years. Mean weight of the patients in Group A was 54.53 ± 1.03 Kgs and mean weight in Group B was 55.38±1.03 Kgs. Majority of the patients in both the groups were male. The mean duration of surgery of group A was 89.53 ± 2.41 minutes and the mean duration of surgery of group B was 81.17 ± 3.23 minutes. In our study, Pain was assessed by the patient himself with the help of linear visual analog scale or objectively by observing the patient for facial expression, complaints of pain. The visual analog scale (VAS)is linear 10cm scale with lowest score of 0 corresponding to no pain and highest score of 10corresponding to worst or intolerable pain perceived by patients. VAS score was assessed at the interval of 30 minutes postoperatively. In our study, VAS score was significantly higher in Fentanyl Group than Butorphanol Group at the end of 60 minutes and 90 minutes. It indicates that butorphanol has good postoperative analgesia. It can be explained by the fact that butorphanol has longer duration of action than fentanyl so patients had immediate postoperative pain relief in Butorphanol group. Butrophanol has good postoperative analgesia, so rescue analgesia required in less no of patients in Group A than Group B. at the end of 30 minutes 6 patients in Group A required rescue analgesia while 12 patients required rescue analgesia in group B. In a study by Usmani H *et al.*, they found that administering a small dose of fentanyl (100 mcg) at the time of induction failed to provide effective postoperative analgesia in patients undergoing ambulatory gynaecologic laparoscopy.[7] In another study by Sukhani R *et al.*, significant postoperative pain in 40% patients receiving fentanyl and in only 17% patients in the butorphanol group was observed ($P < 0.05$).[8] This effect can be due to rapid redistribution of Fentanyl. [9] In a study by Atkinson BD, Truitt LT *et al.*, they compared the analgesic properties of butorphanol and fentanyl. They concluded that butorphanol provided better postoperative analgesia than fentanyl with fewer patient requests for more pain relief. [10] Usmani H *et al.* compared butorphanol and fentanyl for balanced anaesthesia in patients undergoing laparoscopic cholecystectomy. They observed that the proportion of patients with moderate-severe pain during postoperative period was significantly higher in fentanyl group as compared to butorphanol group. Time to first rescue analgesic (tramadol hydrochloride) was also significantly prolonged in butorphanol group as compared to fentanyl group. The incidence of side effects was comparable in both the groups. Thus, butorphanol is an effective analgesic for patients undergoing laparoscopic cholecystectomy under general anaesthesia.[7] All above studies showed similar findings as our study.

CONCLUSION

Butorphanol provides significant postoperative analgesia for a longer duration as compared to fentanyl

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