ORIGINAL ARTICLE

A STUDY ON COMPARISON OF INTRAVENOUS BUTORPHANOL WITH INTRAVENOUS FENTANYL FOR PREMEDICATION IN GENERAL ANESTHESIA

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ABSTRACT

Background: An ideal premedicant drug is anxiolytic, sedative, amnesic, reduces salivary and respiratory tract secretions, analgesic as well as residual post-operative analgesia. The present study was undertaken to compare the effects of intravenous butorphanol and intravenous fentanyl as a premedicant drug in general anesthesia.

Methodology: A comparative study between butorphanol and fentanyl was conducted in 100 patients of either sex at Government Medical College, Surat who belong to ASA physical status I or II, in the age group of 18-65 years. Post-operatively respiratory rate, tidal volume, sedation score, oxygen saturation and assessment of pain score was done in the recovery room.

Results: When comparing both the groups the patients in the butorphanol group were found to be more sedated upto 60 minutes postoperatively. The difference between the two was statistically significant ($p<0.001$). In group F, 82% patients had analgesia for 60-120 minutes while remaining 18% of patients had analgesia for 121-180 minutes. In group F, 44% patients had analgesia for 121-180 minutes while 56% of patients had analgesia for 181-240 minutes. In group F, 82% patients had pain (VAS ≥5) by 30 minutes in the postoperative period whereas none of the patients in Group B had significant pain (VAS ≥5) by 30 minutes.

Conclusion: We conclude that Butorphanol 20 μg/kg gives better attenuation of the hemodynamic response, longer duration of postoperative pain relief, without producing excessive sedation and with negligible side effects in comparison with fentanyl 1 μg/kg when given intravenously as premedicant for general anesthesia.

Key words: Premedicant, fentanyl, butorphanol, general anesthesia

INTRODUCTION

Premedication refers to the administration of drugs before induction and maintenance of anesthesia.[1] An ideal premedicant drug is anxiolytic, sedative, amnesic, reduces salivary and respiratory tract secretions, analgesic as well as residual post-operative analgesia.[2]

Although morphine like alkaloids had been used for analgesia and sedation for centuries, the problem with these drugs were respiratory depression, addition, nausea and vomiting.[3] These side-effects were overcome by the introduction of mixed agonist-antagonist opioid analgesics like butorphanol. Butorphanol is a morphinan chemically related to analgesic levorphanol. It is considered to be safer than pure agonist opioids because of their ceiling effect for respiratory depression and their lower addiction potential. Butorphanol also produces significantly lesser gastrointestinal effects like nausea and vomiting than morphine. Moreover, it produces neither pruritis nor urinary retention.

The present study was undertaken to compare the effects of intravenous butorphanol and intravenous fentanyl as a premedicant drug in general anesthesia. The hemodynamic response to laryngoscopy and intubation, the effects on respiration as well as post-operative sedation and analgesia were evaluated.

METHODOLOGY

A comparative study between butorphanol and fentanyl was conducted in 100 patients of either sex at Government Medical College, Surat. All the patients belonged to ASA physical status I or II, in the age group of 18-65 years. Informed consent was obtained from all the subjects. Patients with liver, renal or hematological disease, females of childbearing age, and patients with a history of tolerance of or dependence on narcotic drugs and those judged to be mentally of limited competence, with poor physical sta-

tus, neurosurgery and cardiac surgery were excluded from the study.

On the day before operation, preoperative assessment was carried out. A complete systemic examination was carried out, to rule out any major systemic dysfunction. All the patients were premedicated with Inj.Glycopyrrolate 0.2 mg intramuscularly half an hour before induction of anesthesia. In the preoperative holding area vital signs and tidal volume were noted. All the patients were familiarized with the visual analogue scale. Patients were randomly divided into two groups of 50 patients each. Two minutes before induction of anesthesia, patients received the study drug.

In Group B: Inj.Butorphanol 20 ug/kg intravenously

In Group F: Inj.Fentanyl 1 ug/kg intravenously

Induction of anesthesia was done with Inj.Thiopentone sodium 4-7mg/kg intravenously upto to the loss of eyelid reflex followed by tracheal intubation facilitated with Inj.Succinylcholine 2mg/kg i.v. Anesthesia was maintained with 60% nitrous oxide in oxygen, isoflurane and Inj.Vecuronium bromide. At the end of the procedure, residual neuromuscular blockade was reversed with Inj. Neostigmine 0.05 mg/kg intravenously and Inj. Glycopyrrolate 0.008 mg/kg intravenously.

Intra-operatively, pulse rate, oxygen saturation via pulse oximetry, systolic and diastolic blood pressure were monitored continuously. Post-operatively respiratory rate, tidal volume, sedation score, oxygen saturation and assessment of pain score was done in the recovery room. Presence of any adverse effects was noted following direct questioning of the patients in the recovery room. Sedation was assessed on the basis of Ramsay scale of sedation score and pain was assessed on the basis of visual analogue scale.

All the patients were interviewed 24 hours after the operation in the ward to get the information regarding their experiences of post-operative pain and adverse effects if any.

RESULTS

In the fentanyl group, the mean age was 31.48±13.12 years and in Butorphanol group, the mean age was 25.56±7.78. Other parameters are as depicted in Table 1.

Table 1: Physical parameters of the study groups

Parameters	Group F	Group B	P value
Age (yrs)	31.48±13.12	25.56±7.78	
Weight (Kg)	48.8±8.54	51.1±11.1	
Male	22 (44)	22 (44)	
Female	28 (56)	28 (56)	
Duration of Surgery (min)	73.4±24.92	86.11±37.98	>0.05
Duration of anesthesia (min)	88.4±23.89	99.44±40.42	>0.05

Table 2: Postoperative sedation score

Parameters	Group F	Group B	P value
Baseline	1.98 ±0.14	1.96 ±0.19	>0.05
2 min after premedication	2.00 ±0	2.00 ±0	>0.05
Postoperative			
0 min	2.12 ±0.59	2.90 ±0.30	<0.05
30 min	1.94 ±0.55	2.72 ±0.45	<0.001
45 min	2.04 ±0.19	2.26 ±0.53	<0.001
60 min	2.00 ±0	2.04 ±0.34	<0.05
90 min	2.00 ±0	1.98 ±0.32	>0.05
120 min	1.98 ±0.14	2.00 ±0	>0.05
180 min	2.00 ±0	2.00 ±0	>0.05

The mean pulse rate before the administration of premedication was 89.54 15.2 in Group F and 91.98 13.91 in Group B. The difference between the groups was statistically insignificant. (p>0.05) On comparing the two groups, the rise in pulse rate was more in the fentanyl group compared to the butorphanol group. The difference between the two groups was statistically significant for upto 5 minutes after intubation (p<0.01). Thereafter it was insignificant upto 30 minutes (p>0.05). In postoperative period also, the increase in the mean pulse rate in fentanyl group was highly significant compared to butorphanol group (p<0.001).

The mean respiratory rate before the administration of premedication of drug was 17.92±1.51 in Group

F and 18.00±2.21 in group B, which was statistically comparable (p>0.05). Postoperatively, there was insignificant difference between mean respiratory rate between the two groups for various time intervals for 3 hours. (p>0.05)

The mean tidal volume before the administration of premedication was 472±59.0 ml in group F and 451±62.2 ml in group B, which was statistically comparable (p>0.05). In the postoperative period, no statistically significant difference was observed between the two groups at various intervals of time (p>0.05)

When comparing both the groups the patients in the butorphanol group were found to be more sedated upto 60 minutes postoperatively. The difference between the two was statistically significant (p<0.001). Thereafter the difference was insignificant upto 3 hours postoperatively.

Table 3: Assessment of total postoperative pain by visual analogue scale

Time	Group F (%)	Group B (%)
0	9 (18)	-
15	19 (38)	-
30	13 (26)	-
45	5 (10)	4 (8)
60	3 (6)	7 (14)
90	1 (2)	10 (20)
120	-	9 (18)
180	-	12 (24)
>180	-	8 (16)

In group F, 82% patients had analgesia for 60-120 minutes while remaining 18% of patients had analgesia for 121-180 minutes. In group F, 44% patients had analgesia for 121-180 minutes while 56% of patients had analgesia for 181-240 minutes. In group F, 82% patients had pain (VAS ≥5) by 30 minutes in the postoperative period whereas none of the patients in Group B had significant pain (VAS ≥5) by 30 minutes (Table).

For postoperative analgesia, injection diclofenac sodium 1.5 mg/kg intramuscularly was given when pain score ≥ 5. 24 hours post-operative analgesia consumption was similar I both groups (p>0.05)

DISCUSSION

The difference in the total duration of analgesia was statistically significant in Group F it was 108±22.15 minutes and in Group B it was 208±29.57 minutes. The total requirement analgesia in the postoperative period did not differ much in both the groups. Beverly K Phillip[4] compared butorphanol 20 μg/kg and fentanyl 1μ g/kg in general anesthesia. They noted 90% postoperative pain in Group B and 93% in Group F. The requirements for additional analgesia in the postoperative period were also not different. In the study conducted by Hammad Usmani[5], significant postoperative pain in the recovery room was experienced by 12 (40%) patients receiving fentanyl and in only 5 (17%) patients in butorphanol group (p<0.05).

In our study, there was statistically significant difference (p<0.001) in the sedation score in butorphanol group upto 45 minutes postoperatively. More patients in the butorphanol group had sedation score ≥2 than in the fentanyl group. Our findings correlate with Beverly K Philip[4] who noted more sedation in butorphanol group than fentanyl for 45 minute in the recovery room as well as long time for return to baseline levels of sedation at 60 minutes. Hammad Usmani[5] noted excessive drowsiness in 7 patients who received 40 μg/kg butorphanol and in 5 patients in fentanyl group, who received 2 μg/kg of fentanyl, one hour after admission to the recovery room.

CONCLUSION

We conclude that Butorphanol 20 μg/kg gives better attenuation of the hemodynamic response, longer duration of postoperative pain relief, without producing excessive sedation and with negligible side effects in comparison with fentanyl 1 μg/kg when given intravenously as premedicant for general anesthesia

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