ORIGINAL RESEARCH PAPER

Anesthesiology

KEY WORDS: Bupivacaine, Fentanyl, Nalbuphine, Spinal Anaesthesia, Orthopaedic Surgery.

"COMPARATIVE STUDY OF NALBUPHINE HYDROCHLORIDE AND FENTANYL AS ADJUVANT TO HYPERBARIC BUPIVACAINE FOR SPINAL ANAESTHESIA IN ORTHOPAEDIC SURGERY."

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ABSTRACT

Background: Neuraxial opioids when added to local anaesthetics will prolong the duration of sensory block, improve quality of block and no unwanted sympathetic blockade leading to hypotension.

Aim And Objectives: Compare the efficacy of intrathecal Nalbuphine and Fentanyl as adjuvants to hyperbaric Bupivacaine on onset and duration of sensory blockade, onset and duration of motor blockade, two segment sensory regression time.

Method: 30 patients between the age group 18-50 years belonging to ASA I and II posted for elective orthopaedic lower limb surgery were randomly divided into two groups. Each group consisting of 15 patients, received either 3 ml 0.5% Bupivacaine with 1 mg (0.1 ml) of nalbuphine (group N) or 3 ml 0.5% Bupivacaine with 25 mcg Fentanyl (Group F). The onset, maximum level and duration of sensory and motor blockade and hemodynamic parameters were monitored

Result : There was no significant difference in onset of sensory and motor blockade. Duration of sensory blockade was significantly prolonged (115.5 ± 5 min) in Group N than in Group F (100.5 ± 5.79 min) and duration of motor block was significantly extended in patients of Group I(146.7± 10.26 min) than Group II (131.2 ±12.92 min.

Conclusion: 1 mg Nalbuphine in 3 ml 0.5% hyperbaric Bupivacaine in patients increases the duration of sensory and motor block as compared to Fentanyl as well as provides effective analgesia time more than Fentanyl in patients scheduled for orthopaedic surgery surgery under subarachnoid block

INTRODUCTION:

Spinal anaesthesia is the most popular and effective regional anaesthetic technique used for lower limb surgeries. Various local anaesthetics commonly used for spinal anaesthesia are lignocaine, bupivacaine, levobupivacaine and ropivacaine.[1,2]. Intrathecal hyperbaric bupivacaine (0.5%) has become the most widely used drug as it provides intense motor and sensory blockade of long duration.[3]

The use of intrathecal opioids has become a widely accepted technique for providing effective postoperative pain relief.[4]. Intrathecal opioids reduce the release of gamma amino butyric acid and glycine by a calcium-independent process from dorsal horn neurons.[5]

Nalbuphine is a mixed opioid agonist–antagonist which can prove to be particularly advantageous because of the potential to maintain or even enhance opioid-based analgesia while simultaneously eliminating the common μ-opioid side effects (nausea, emesis, pruritis, constipation, undesirable sedation, respiratory depression and the development of tolerance/ dependence).[6-8].

Fentanyl provides dense blockade with complete intra- and postoperative analgesia without causing hemodynamic instability. It has relatively fewer side effects which are manageable and very well tolerated by the patients.

So we decided to conduct a study to assess which opioid among the two is better with regard postoperative analgesia and haemodynamic stability.

Hence , study was undertaken to compare the effectiveness of two opioids– nalbuphine and fentanyl as adjuvant to bupivacaine for spinal block in elective orthopaedic surgery.

METHOD:

Standard preanesthetic evaluation was performed, and informed written consent was taken before the surgery. Patients were allowed to fast for 8 h. On arrival to the operation theatre. 30 patients were included in this prospective randomised double blinded study was randomly allocated into two equal groups, with 15 patients in each, using a computer generated randomization schedule and sealed opaque envelope method.

In the operating room, electrocardiogram, pulse oximetry and non-invasive blood pressure (BP) were monitored, and baseline values were recorded. under aseptic precautions using 25G Quincke needle SAB was performed in sitting position at L3-L4 interspace or L4-L5 interspace. Patients were evaluated for sensory and motor block, intra- and postoperative hemodynamics, and side effects. Just before spinal anaesthesia, syringe was handed over to the anaesthesiologist performing the subarachnoid block, who was also the observer of the study. Thus, both the observer and the patient were blinded to the study drugs.

Group N: Received Intrathecal 0.5% hyperbaric bupivacaine 15 mg (3 ml) with injection nalbuphine 1 mg (0.1 ml).

Group F: Received Intrathecal 0.5% hyperbaric bupivacaine 15 mg (3 ml) with 25 microgram fentanyl (0.5ml).

After injection of drug (subarachnoid), patients were placed in supine position. Intraoperatively heart rate (HR), systolic BP, diastolic BP and mean arterial pressure (SBP, DBP, MAP), oxygen saturation (SpO2), respiratory rate (RR) were recorded every 2 min for first 10 min then every 5 min till end of procedure.

Following Observations Were Done-

1. Onset of sensory block –evaluated by pinprick method at every 1 minute interval. Sensory block was defined adequate when level reaches T6. Postoperatively 2 segment regression time was noted to assess recovery of block.

2. Onset of motor block –assessed by modified Bromage scale

Grade 0-No block-full knee and ankle flexion
Grade 1-Partial block-just able to flex knee, full flexion of ankle

Grade 2-Almost complete block-unable to flex knee, full flexion of ankle

Grade 3-Complete block –unable to flex knee and ankle

Duration of motor blockade was considered, when modified Bromage scale returns to zero.

3. Complications-

Hypotension-mean BP falls > 30% of baseline value.
Treatment-Fluids and Inj. Mephentermine 6 mg iv stat.
Bradycardia-HR < 60/min, HR <50/min in patients on ß-blockers Treatment-Inj. Atropine 0.6 mg iv

Inclusion Criteria:

- ASA Physical status I-II
- Patients posted for elective Orthopaedic surgeries schedule to receive regional anaesthesia .
- Age between 18-50 years.

Exclusion Criteria:

- ASA status III-V
- Contraindications to spinal blockade, such as patient refusal, cardiorespiratory problems, coagulopathy, neurological disease, psychological troubles, endocrinal disease, and allergy to the used drugs.
- Uncooperative and unwilling patients, not following verbal command.
- History of burns, trauma
- Morbid obesity
- Failure of spinal blockage

RESULT:

There was no significant difference in onset of sensory and motor blockade. Duration of sensory blockade was significantly prolonged (115.5 ± 5 min) in Group N than in Group F (100.5 ± 5.79 min) and duration of motor block was significantly extended in patients of Group I(146.7± 10.26 min) than Group II (131.2 ±12.92) .

Table 1: Time To Reach T10 Sensory Block

GROUP	N	MEAN	SD	P VALUE
N	15	3.14	0.58	>0.05
F	15	3.35	0.32	

In this study, we observed that time to reach T10 sensory level, 3.14±0.58 min in GROUP N which is not significant to GROUP F 3.35±0.32 min.

Table 2 : Time To Reach Complete Motor Block

GROUP	N	MEAN	SD	P VALUE
N	15	7.57	2.51	>0.05
F	15	8.23	3.2	

So, in our study there was no significant difference in onset of sensory and motor blockade.

Table 3: Duration For 2 Segment Regression Of Sensory Block

GROUP	N	MEAN	SD	SE	P VALUE
N	15	115.5	15.72	4.060	<0.05
F	15	100.5	5.79	1.496	

Time to two segment regression was significantly prolong in patient of GROUP N [115.5±15.72] min as compared to patients of GROUP F [100.5±5.79] min.

Table 4: Duration Of Motor Block

GROUP	N	MEAN	SD	SE	P VALUE
N	15	146.7	10.26	2.645	<0.05
F	15	131.2	12.92	3.12	

Mean duration of motor block was significantly extended in GROUP N [146.7±10.26] min as compared to GROUP F[131.2±12.92] min.

Table 5: Duration Of Effective Analgesia

GROUP	N	MEAN	SD	SE	P VALUE
N	15	309.2	24.81	6.407	<0.05
F	15	248.86	28.51	7.36	

Mean duration of effective analgesia was more prolong in GROUP N [309.2±24.81] min as compared to GROUP F [248.86±28.51] min as shown in Table 5 and fig 1.

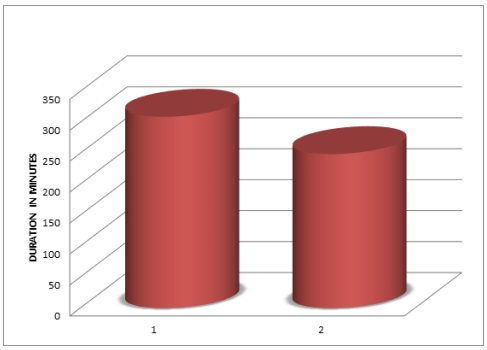

Fig 1: Chart Of Total Duration Of Analgesia

DISCUSSION

Spinal anesthesia is the preferred technique for the orthopaedic surgeries. Opioids as adjuvants to local anesthetics provide better perioperative sensory and motor blockade with prolongation of postoperative analgesia. By reducing the local anesthetic dosage, they decrease their toxicity and the side effects associated with higher level of blockade. Use of opioid adjuvants such as morphine, fentanyl, and nalbuphine along with bupivacaine has been very well established.(11,12,13).

In the present study, we compared Nalbuphine and fentanyl as adjuvants to bupivacaine in spinal anesthesia. The results of our study showed that onset of sensory and motor block, duration of sensory and motor block, and effective analgesia were similar in both groups. However, fentanyl had lower VAS scores and was more efficient in providing better quality of analgesia in the early postoperative period than compared to nalbuphine.

Culebras et al compared intrathecal Nalbuphine With intrathecal Morphine with Different doses of 0.2 mg, 0.8 mg and 1.6 mg Nalbuphine and concluded that intrathecal Nalbuphine 0.8 mg provides efficient intraoperative and postoperative analgesia, without side effects. They found that intrathecal Nalbuphine 1.6 mg did not increase the analgesic efficacy but increased the adverse effects.11 It implies that by increasing the dose of Nalbuphine.[16]

Our study we conclude that nalbuphine has prolong sensory and motor block and prolong analgesic efficacy as compared to fentanyl.

CONCLUSION:

Inj.Nalbuphine (1mg) as intrathecal adjuvant to 0.5% hyperbaric Bupivacaine increases the duration of sensory block, motor block and the effective analgesia time more efficiently than Inj. Fentanyl in patients scheduled for elective orthopaedic surgery under suba rachnoid block. So, intrathecal Nalbuphine can be used as an alternative to intrathecal Fentanyl in inguinal hernia surgeries providing better postoperative analgesia with no significant complication.

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