ORIGINAL RESEARCH PAPER | Medical Science | Volume : 6 | Issue : 9 | September 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

An Observational Study to Compare the Efficacy of Intrathecal Fentanyl and Nalbuphine with Bupivacaine in Spinal Anaesthesia

KEYWORDS: Bupivacaine, Nalbuphine, Fentanyl, Spinal Anesthesia

Dr Gaurav Singh	Dr. Hetal Parikh	Dr.Rama Upadhyaya
3rd year Resident Doctor, S.B.K.S. MEDICAL INSTITUTE AND RESEARCH CENTRE,SUMANDEEP VIDYAPEETH UNIVERSITY, PIPARIA, VADODARA,GUJARAT	Professor, S.B.K.S. MEDICAL INSTITUTE AND RESEARCH CENTRE,SUMANDEEP VIDYAPEETH UNIVERSITY, PIPARIA, VADODARA,GUJARAT	Prof. And Head of Dept. of Anesthesiology, DEPARTMENT OF ANAESTHESIOLOGY, S.B.K.S. MEDICAL INSTITUTE AND RESEARCH CENTRE,SUMANDEEP VIDYAPEETH UNIVERSITY, PIPARIA, VADODARA,GUJARAT

ABSTRACT ***AIMS AND OBJECTIVES****: Various adjuvants have been used with local anesthetics in spinal anesthesia to avoid intraoperative visceral and somatic pain and to provide prolonged post operative analgesia.The aim of this study was to evaluate the onset and duration of sensory and motor block, hemodynamic effect,postoperative analgesia and adverse effects of fentanyl or nalbuphine with 0.5% Bupivacaine in spinal anesthesia.*
MATERIAL AND METHODS*: Sixty patients classified in ASA I & II were scheduled for inguinal and lower limb surgeries. Patients were randomly allocated to receive either Bupivacaine (0.5%)2.5 ml plus Nalbuphine 1 mg (0.1 ml) + 0.4 ml NS(group N,n=30) or Bupivacaine(0.5%) 2.5 ml plus Fentanyl 25 µg(0.5 ml)(group F,n=30) intrathecal.Time to reach sensory blockade to T10 segment, the degree of motor block,side effects and the perioperative analgesic requirements were assessed.*
OBSERVATION AND RESULTS*: Comparatively fentanyl group showed rapid onset of complete motor block otherwise statistically no significant difference was seen in hemodynamic parameters, duration of motor block and adverse effects. Duration of post operative analgesia was prolonged in nalbuphine group but statistically insignificant.*
CONCLUSION*: Patients in fentanyl group showed significantly faster onset than nalbuphine group otherwise no significant difference was seen hemodynamically and in duration of motor effect. Duration of sensory effect was longer in nalbuphine group but statistically insignificant.*

INTRODUCTION

Regional anesthesia has emerged as an important technique due to its simplicity,effectiveness and safety

Neuraxial block with hyperbaric bupivacaine are becoming popular as it has many advantages over general anesthesia[1] but it has shorter duration of postoperative analgesia.

So various drugs are used as adjuvant with local anesthetics to achieve quick and prolong block with long duration of analgesia.

Intrathecal opioids are synergistic with local anesthetics and are commonly added for potentiating their effects ,reducing their doses and thereby reducing complication and side effects

Such opioids offer hemodynamic stability and also prolong the duration of post operative analgesia

Fentanyl –lipophilic opioid µ receptor agonist with a rapid onset on intrathecal administration is an adjuvant which shows its effect by combination with opioid receptors in dorsal horn of spinal cord[2]

Nalbuphine , a mixed agonist antagonist opioid has a potential to attentuate the mu opioid effect and enhance the kappa opioid effect without the undesirable side effects of mu agonist[3]

AIM AND OBJECTIVE

AIM-

The aim of the study is to compare the effects of Inj. **Nalbuphine**(1 mg) with Inj. **Fentanyl** (25µg) as an adjuvant to Hyperbaric 0.5% **Bupivacaine**(12.5 mg) in spinal anaesthesia.

OBJECTIVES-

To Compare :-

- Onset and duration of sensory blockade.
- Onset and duration of motor blockade.
- Time of two segment regression.
- Duration of analgesia
- Haemodynamic parameters – Heart Rate,Systolic Blood Pressure,Diastolic Blood Pressure.
- Side effects/complications

MATERIAL AND METHODS

After approval from ethical committee and written informed consent 60 patients were selected for elective surgery under spinal anesthesia.

SELECTION CRITERIA:

Inclusion criteria:

- ASA I & ASA II patients undergoing lower abdominal and lower limb surgeries.
- Patients aged between 18-60 years of both the gender.
- Patients willing to sign informed consent.

Exclusion criteria:

- Patients with medical complications like anemia, severe hypovolemia, shock, septicemia, and hypertension.
- Patients with coagulation disorders or on anticoagulant therapy.

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- Local infection at the site of proposed puncture for spinal anaesthesia
- Patient refusal.
- H/o Ischemic heart disease, cardiac conduction defect
- ASA group III or more
- H/o drug allergy to study drug

A pre-anesthetic check up was done in all patients which included a detailed History, General, Systemic Examination and Routine Investigations.

Monitoring -
- Pulse
- NIBP
- SPO2
- ECG

Premedication-
- IVF preload with ringer lactate@10ml/kg.
- Inj. Glycopyrolate 0.2 mg IV
- Inj. Emset 4 mg IV

Intraoperative-
- Under aseptic precaution lumbar puncture at L3-L4 interspace using 23G spinal needle with patient in sitting position was performed.
- Study drug was injected to the respective group patients into the subarachnoid space after noting free flow of CSF with the operating table kept flat. Patient turned supine immediately and supplemental oxygen @ 3-4 ltrs/min was given.
- Group F received 2.5 ml, 0.5% hyperbaric bupivacaine + 25 µg Fentanyl(0.5ml)(Total 3ml)
- Group N received 2.5ml, 0.5% hyperbaric bupivacaine + 1 mg Nalbuphine(0.1ml)+ 0.4 ml normal saline(Total 3 ml)
- No intravenous sedation was given and at the end of surgery all patients were monitor
- in post-op recovery.

Assessment of Sensory Blockade:
Tested by pinprick using Hypodermic needle

- Time to reach T10 Segment was considered as onset of sensory block and duration of sensory was counted from onset to the time of two segment regression

Assesment of motor blockade :
Tested by bromage scale

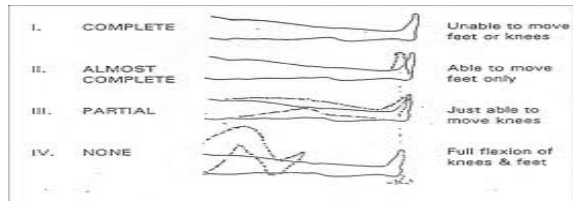
- Onset of motor block was taken as bromage scale 3 ie patient unable to move hip, knee and ankle
- Duration of motor block was taken from onset to Bromage scale 0 ie able to move hip, knee and ankle.

Bromage scale:
Bromage 0: the patient is able to move the hip, knee and ankle.

Bromage 1: the patient is unable to move the hip, but is able to move the knee and ankle.

Bromage 2: the patient is unable to move the hip and knee, but is able to move the ankle.

Bromage 3: the patient is unable to move the hip, knee and ankle.



- Onset of sensory and motor block was assessed every 2mins for 1st 10 mins and then every 10 mins upto 30 mins , then every 30 mins.
- Hemodynamic changes : Pulse rate , Systolic and Diastolic blood pressure,SPO_2 was monitored at regular intervals
- Post operation duration of sensory and motor block and analgesia was assessed every 15 mins for first two hours and then every 30 mins

Duration of analgesia :
- Assessed using visual linear analogue scale (VAS) and was explained to patient one day prior to surgery
- It was carried out on 10 cm line where1st end mark '0' means no pain and end mark'10' means severe pain and patient was asked to mark the severity.VAS 4 was considered as time for rescue analgesia.

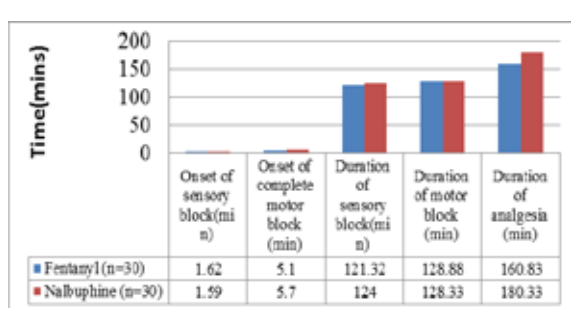
Parameters were Measured:
- Heart rate
- Systolic and Diastolic blood pressure
- SPO_2
- Onset of sensory blockade(T10 segment level when achieved)
- Onset of motor blockade (bromage scale 3)
- Total duration of sensory block
- Total duration of motor block
- Duration of analgesia(when patient complains of moderate pain VAS> 4 (Visual analogue scale) post operation,rescue analgesia inj diclofenac 1.5 mg/kg was given.
- Complications , if any

OBSERVATIONS AND RESULTS

Table 1. Demographic data of two studied groups.

Characteristics	Group F(n=30)		*p* Value
AGE(yrs)	39.27 ± 5.14	39.92 ± 4.45	0.651(NS)
ASA(I / II)	23/7	19/11	-
SEX(M/F)	18/12	21/9	-
WEIGHT(Kg)	76.82 ± 10.27	79.51 ± 11.87	0.248(NS)
HEIGHT (Cm)	166.94 ± 7.25	168.30 ± 8.94	0.412(NS)

Demographic parameters were comparable between the two groups.



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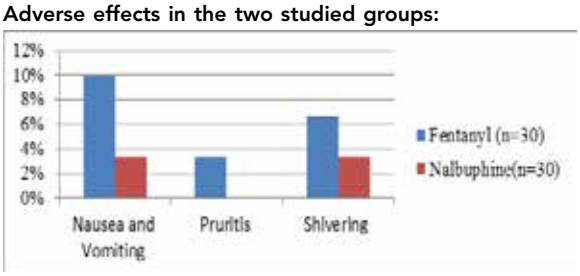
No statistically significant difference was found between both groups with regard to the onset and duration of sensory block and duration of motor block(P>0.05= not sigificant).

There was statistically significant more rapid onset of complete motor block in group F(P value 0.008) than in group N(P value <0.01= highly significant).

The duration of analgesia was more prolonged in group N than in group F but was not statistically significant(P>0.05= not sigificant).

Adverse effects in the two studied groups:



P>0.05 =not significant

The adverse effects was less in group N than in group F but there was no significant difference between both group.

DISCUSSION

- Fentanyl and Nalbuphine enhances the spinal anesthesia produced by Bupivacaine[4]
- Nalbuphine is primarily a kappa agonist. Kappa receptors are distributed throughout brain and spinal cord areas involved in nociception.
- Thus Nalbuphine acts primarily at the level of the first synapse in the nociceptic system in producing analgesia[7,8,9]
- The Fentanyl (μ agonist) exerts its action by opening K^+ channel and reducing Ca^{++} influx ,resulting in inhibition of transmitter release[4]
- In our study motor onset is significantly faster in Group F than Group N which is similar to the study done by Ravikiran J Thote et al and Gomma HM et al.
- Duration of post operative analgesia was more in Nalbuphine group than Fentanyl Group but statistically insignificant which was similar to other study[3,4]
- Side effects were less in Nalbuphine group than the Fentanyl group but with no statistical significant difference.
- Incidence of pruritis was higher with fentanyl group which may be due to the highly lipophilic nature of fentanyl and the small dose used, which limited its rostral spread. Biswas et al in caesarian section concluded the same result[16] .

CONCLUSION

Nalbuphine- bupivacaine combination is better than Fentanyl –bupivacaine combination in respect to the duration of sensory blockade and postoperative analgesia without significant increase in adverse effect.

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