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Original Research Article

Comparison of Nalbuphine Hydrochloride and Fentanyl as an Adjuvant to Bupivacaine for Spinal Anaesthesia in Lower Limb Surgeries

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Abstract

Background & Methods: The aim of the study is to Comparison of nalbuphine hydrochloride and fentanyl as an adjuvant to bupivacaine for spinal anaesthesia in lower limb surgeries. Patient was inquired for 6 hours fasting period. I.V access was established using an 18 gauge cannula and a fluid ringer lactate 10-15ml/kg body weight was given as preload over 20-25 min prior to subarachnoid block. Inj ondansateron 8 mg was given to every patient. Oxygen via facemask was administered if needed during anaesthesia and surgery.

Results: Duration of motor blockade was 218.33 min in BN group and 223.4 min in BF group.It was significantly higher among participants of BF group compared to that of participants in BN group. Duration of sensory blockade among group BF was 237.53 min and in group BN was 227.6 min. Duration of sensory blockade was significantly higher among participants of BF group compared to that of participants in BN group

Conclusion: Comparison between intrathecal fentanyl and intrathecal nalbuphine concluded that Intrathecal fentanyl is a good alternative to nalbuphine which provides long duration of sensory and motor blockade in lower limb surgeries. Duration of analgesia in intrathecal nalbuphine is prolonged as compared to intrathecal fentanyl as adjuvants hence it may be used with better results in lower limb surgeries for post-operative analgesia.

Keywords: nalbuphine, hydrochloride, bupivacaine, anaesthesia & limb.
Study Design: Observational Study.

1. Introduction

Pain has always been the major concern for patients after surgery. It may lead to a plethora of issues such as distress to patients, hampering their well-being, and may prolong their hospital stay. It can result in a poor clinical outcome for the surgeons and anaesthetists. In the current scenario there are a lot of choices of pharmacological agents and techniques for postoperative pain management[1].

Spinal Anaesthesia is a safe and reliable technique for surgery of the lower abdomen and lower limbs, nevertheless, some of its characteristics may limit its use for ambulatory surgeries including delayed ambulation, risk of urinary retention and pain after block regression[2].

Bupivacaine, which is the most commonly used drug for spinal anesthesia, has slow onset, high potency, and relatively short postoperative analgesia. However hemodynamic instability

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is observed with higher volumes of 0.5% bupivacaine[3]. Opioids are the most popularly used adjuvants added to bupivacaine in spinal blockade to obtain a sufficient intraoperative visceral analgesia and increase the duration and quality of postoperative analgesia, with less sympathetic block and hemodynamic effect .Opioids intrathecally decrease nociceptive inputs from A delta and C fibres without affecting dorsal root axons or somatosensory evoked potentials. During the initial days morphine and Fentanyl were the most preferred opioids. When these were used intrathecally along with the local anaesthetics such as Bupivacaine, they helped in prolonging the post-operative analgesia[4]. On a biochemical level, Fentanyl is more lipid soluble than morphine and was readily eliminated from the cerebro-spinal fluid. Also it is very well tolerated by the patients as it doesn't cause many side effects[5].

In recent time, nalbuphine has gained popularity among the anaesthetic society as an adjuvant to local anaesthetics, Nalbuphine, when binds to μ receptors, competitively displaces other μ antagonists from the receptors without itself displaying any agonistic effect[6]. When it binds to kappa receptors, it has agonistic effect. Hence, it is a mixed agonist-antagonist. It produces analgesia and sedation without μ side effects. Nalbuphine is opioids μ-receptor antagonist and κ-receptor agonist.[2] One of the major advantages of nalbuphine is that it provides good intra and post-operative analgesia. Also , in contrast to other centrally acting opioid analgesics, nalbuphine rarely causes respiratory depression and has a low risk for potential abuse[7].

2. Material and Methods

This study was done in Department of Anaesthesiology, Gandhi Medical College and Associated Hospitals, Bhopal from January 2021 to July 2022 after approval from Institutional ethics committee and obtaining written and informed consent from the patients. After complete pre-anesthestic check-up and investigations, patient with a history of clinically significant cardiovascular, pulmonary, hepatic, renal, neurologic, psychiatric or metabolic disease were excluded from the study.

In the operation theatre, patient was inquired for 6 hours fasting period. I.V access was estabilished using an 18 gauge cannula and a fluid ringer lactate 10-15ml/kg body weight was given as preload over 20-25 min prior to subarachnoid block. Inj ondansateron 8 mg was given to every patient. Oxygen via facemask was administered if needed during anaesthesia and surgery.

Patient's baseline non-invasive arterial pressure, pulse rate, saturation, and continuous ECG monitoring were instituted.

TECHNIQUE – The patient was placed in left lateral position or sitting position , skin was cleaned and draped. After local infiltration at L3-4 interspace with 2% lidocaine 2ml , the subarachnoid space was entered using a 25-gauge Quincke type spinal needle. Once free flow of CSF was recognized ,the study solution was injected at 0.2ml/sec, aspirating CSF at the beginning and end of the injection to confirm needle position.

All patients were pre-medicated with tablet ranitidine 150mg, tablet metachlopramide 10mg, and tablet alprazolam 0.5mg on the night before surgery. All the patients were instructed to fast overnight before surgery.

The patients were given the study groups as follows:

1) **GROUP BN** - 30 patients received 0.8mg of nalbuphine (diluted to 0.5ml) with 12.5mg(2.5ml) of 0.5% hyperbaric bupivacaine (total volume – 3 ml)
2) **GROUP BF** - 30 patients received 25 microgram of fentanyl with 12.5mg (2.5ml) of 0.5% hyperbaric buvivacaine (total volume- 3ml)

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE1, 2024

INCLUSION CRITERIA:
1. Patients with ASA grade –I and ASA grade – II
2. Age group 18-60 years of either sex
3. Patients with average height (>5feet)
4. All patients posted for elective lower limb surgeries

EXCLUSION CRITERIA:
1. Patient refusal or not giving consent
2. Patient with neurological deficit
3. Spine/NEUROLOGICAL deformities
4. Local skin infections or disease
5. Patient with bleeding diathesis

3. Result

Table 1: COMPARISION OF ONSET OF SENSORY EFFECT

Group Statistics					
	group	N	Mean(min)	Std. Deviation	p Value
ONSET OF SENSORY EFFECT	BN	30	2.888112	.5865016	0.001

Mean time of onset of sensory effect in group BN was 2.89 min and in group BF was 2.28 min. Hence onset of sensory effects was earlier among BN group compared to that in BF group. This differences in mean time of onset of sensory effect between the 2 groups was found to be statistically significant in this study.

Table 2:COMPARISION OF ONSET OF MOTOR EFFECT

Group Statistics					
	group	N	Mean(min)	Std. Deviation	p Value
ONSET OF MOTOR EFFECT	BN	30	2.224509	.3429908	0.001

Mean time of onset of motor effect in BN group was 2.22 min and in group BF was 1.52 min. Hence onset of motor effects was earlier among BN group compared to that in BF group. This differences in mean time of onset of motor effect between the 2 groups were found to be statistically significant in this study.

Table 3: VAS SCORE COMPARISON

Group Statistics					
	group	N	Mean	Std. Deviation	P value
VAS SCORE	BN	30	6.73	1.048	.065
	BF	30	6.27	.868	.066

There was no statistically significant difference in mean VAS score between the two groups.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE1, 2024

Table 4: COMPARISON OF DURATION OF MOTOR BLOCKADE

Group Statistics					
	group	N	Mean (min)	Std. Deviation	P value
Motorduration	BN	30	218.3333	2.05667	0.001
	BF	30	223.4000	3.13600	

Duration of motor blockade was 218.33 min in BN group and 223.4 min in BF group.It was significantly higher among participants of BF group compared to that of participants in BN group

Table 5: COMPARISON OF DURATION OF SENSORY BLOCKADE

Group Statistics					
	group	N	Mean (Min)	Std. Deviation	Std. Error Mean
Sensoryduration	BN	30	227.6000	1.79271	0.001
	BF	30	237.5333	3.26669	

Duration of sensory blockade among group BF was 237.53 min and in group BN was 227.6 min. Duration of sensory blockade was significantly higher among participants of BF group compared to that of participants in BN group

4. Discussion

In this study, the mean age of participants belonging to group BN (Bupivacaine Nalbuphine group) was 42.90±2.631 and that of group BF (Bupivacaine Fentanyl group) was 43.90±2.708. There was no statistically significant difference between the mean age of both the groups. A similar result was observed in a study by Umesh N. Prabhakaraiah et al where the mean age of participants who received Bupivacaine and nalbuphine was 42.57±0.45 years and that of bupivacaine-fentanyl group was 42.93±12.06.The study observed that there was no statistically significant difference between the mean age of both the groups[8].

In this study, 53.33% of participants in both the groups were males and the rest were females. There was no statistically significant difference in gender distribution between the groups in this study. Another study by Umesh N. Prabhakaraiah et al also observed a comparable gender distribution among the groups without any statistically significant difference. In their study proportion of females was higher than that of males in both the groups[9].

In this study, onset of sensory effect was observed within 2.888±0.586 minutes among the participants of group BN while the same was observed within 2.282±0.401 minutes among the participants of group BF. This difference in mean time of onset of sensory effect between the 2 groups was found to be statistically significant in this study. The present study observed statistically significant difference in mean duration for onset of motor effect. In group BN the mean time of onset of motor effect was 2.224±0.343 minutes and that of group BF was 1.523±0.566 minutes. Another study by Vivek Mavaliya et al observed a longer time for onset for motor effects compared to the present study. In their study, onset for motor effects took 6.97±0.95 minutes in fentanyl group and 7.14±1.03 minutes in Nalbuphine group. There was no statistically significant difference in onset time between the two groups[10].

Comparison of pulse rate of the two groups was done at various time intervals in this study. The results showed that there was no statistically significant difference in mean pulse rate of

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the two groups at different time intervals. On comparing systolic BP and diastolic BP of the two groups at various time intervals in this study, the results showed that there was no statistically significant difference in mean systolic BP or mean diastolic BP of the two groups at different time intervals. Similarly, no statistically significant difference was observed in SPO2 and respiratory rate of participants in both the groups at different time intervals. Another study by Madhu Srinivasaiah et al also observed a similar result. They reported that there was no statistically significant difference in heart rate, systolic blood pressure, diastolic blood pressure or mean arterial blood pressure between groups at different time intervals in intraoperative and post-operative period. They also observed that none of the patients in both groups developed hypotension or bradycardia during observation period[11].

5. Conclusion

Comparison between intrathecal fentanyl and intrathecal nalbuphine concluded that Intrathecal fentanyl is a good alternative to nalbuphine which provides long duration of sensory and motor blockade in lower limb surgeries. Duration of analgesia in intrathecal nalbuphine is prolonged as compared to intrathecal fentanyl as adjuvants hence it may be used with better results in lower limb surgeries for post-operative analgesia.

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