e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(4); 972-975

Original Research Article

Comparison of Analgesic Effect of 0.4 mg versus 0.8 mg Intrathecal Nalbuphine as an Adjuvant to 0.5% Hyperbaric Bupivacaine in Lower Abdominal Surgeries: A Randomized Double-Blind Study

Sandeep Kumar Sharma[1], Rajbala[2], Santosh Kanwar[3]

[1]Senior Resident, Department of Anaesthesia, SMS Medical College, Jaipur, Rajasthan, India
[2]Senior Medical Officer, Department of Anaesthesia, SMS Medical College, Jaipur, Rajasthan, India
[3]Senior Resident, Department of Anaesthesia, SMS Medical College, Jaipur, Rajasthan, India

Received: 01-01-2026 / Revised: 15-02-2026 / Accepted: 21-03-2026
Corresponding author: Dr. Rajbala
Conflict of interest: Nil

Abstract

Background: Intrathecal adjuvants are widely used to enhance the quality and duration of spinal anaesthesia. Nalbuphine, a mixed opioid agonist-antagonist, has shown promising results in improving postoperative analgesia with minimal side effects.

Objective: To compare the analgesic efficacy of intrathecal nalbuphine 0.4 mg versus 0.8 mg as an adjuvant to 0.5% hyperbaric bupivacaine in lower abdominal surgeries.

Methods: This randomized double-blind interventional study included 60 patients (ASA I–II) undergoing elective lower abdominal surgeries. Patients were divided into two groups (n=30 each): Group A received 0.4 mg nalbuphine and Group B received 0.8 mg nalbuphine with 0.5% hyperbaric bupivacaine intrathecally. Parameters assessed included onset and duration of sensory and motor block, duration of analgesia, Visual Analog Scale (VAS), hemodynamic variables, and adverse effects.

Results: Demographic parameters were comparable between groups. Onset of sensory and motor block showed no significant difference ($p>0.05$). However, duration of analgesia was significantly prolonged in Group B (278.03 ± 7.48 min) compared to Group A (236.83 ± 9.84 min) ($p<0.001$). VAS scores were significantly lower in Group B at multiple postoperative intervals. Hemodynamic parameters remained stable in both groups. Although adverse effects were more frequent in Group B, the difference was not statistically significant.

Conclusion: Intrathecal nalbuphine significantly prolongs postoperative analgesia. While 0.8 mg provides longer analgesia, 0.4 mg offers a better safety profile, making it an optimal dose for clinical use.

Keywords: Intrathecal nalbuphine, spinal anaesthesia, bupivacaine, postoperative analgesia, VAS score, randomized study.

DOI: 10.25258/ijcpr.18.4.154

Introduction

Spinal anaesthesia is one of the most widely used regional anaesthetic techniques for infraumbilical surgeries due to its simplicity, reliability, and cost-effectiveness. It provides dense sensory and motor blockade along with excellent muscle relaxation. However, one of its major limitations is the relatively shorter duration of postoperative analgesia, which often necessitates additional analgesic interventions [1,2].

Bupivacaine, a long-acting amide local anaesthetic, is commonly used for spinal anaesthesia because of its prolonged duration and favorable safety profile. Despite these advantages, it may delay motor recovery and prolong hospital stay. To overcome these limitations, various intrathecal adjuvants have been explored to enhance analgesic efficacy while minimizing adverse effects [3]. Opioids have been extensively studied as intrathecal adjuvants due to their ability to provide effective analgesia by acting on opioid receptors in the spinal cord. Nalbuphine is a synthetic opioid with mixed agonist-antagonist properties, primarily acting as a kappa receptor agonist and mu receptor antagonist. This unique pharmacological profile allows it to provide effective analgesia with reduced incidence of typical opioid-related side effects such as respiratory depression, pruritus, and nausea [4,5].

Several studies have demonstrated that the addition of nalbuphine to intrathecal bupivacaine prolongs postoperative analgesia and improves patient satisfaction. Previous randomized trials have shown that intrathecal nalbuphine significantly enhances

the duration of analgesia without major hemodynamic instability [6,7].

However, the optimal dose of intrathecal nalbuphine remains controversial. While higher doses may provide prolonged analgesia, they may also increase the risk of adverse effects. Dose-ranging studies have suggested that nalbuphine in doses between 0.4 mg and 0.8 mg provides effective analgesia with minimal complications [8,9].

Therefore, the present study was conducted to compare the efficacy of two different doses of intrathecal nalbuphine (0.4 mg and 0.8 mg) as adjuvants to 0.5% hyperbaric bupivacaine in patients undergoing lower abdominal surgeries. The primary objective was to evaluate the duration of postoperative analgesia, while secondary objectives included assessment of onset and duration of sensory and motor block, VAS scores, hemodynamic stability, and incidence of adverse effects.

Materials and Methods

This randomized, double-blind, interventional study was conducted in the Department of Anaesthesiology at a tertiary care hospital.

Study Population: A total of 60 patients aged 25–55 years, belonging to ASA physical status I and II, scheduled for elective lower abdominal surgeries were included. Patients with contraindications to spinal anaesthesia, drug allergies, or significant systemic illnesses were excluded.

Study Design and Randomization: Patients were randomly allocated into two groups (n=30 each) using the sealed envelope method:

- **Group A:** 0.4 mg nalbuphine + 0.5% hyperbaric bupivacaine
- **Group B:** 0.8 mg nalbuphine + 0.5% hyperbaric bupivacaine

Both groups received a total intrathecal volume of 3 ml.

Procedure: Spinal anaesthesia was administered at L3–L4 interspace using a 25G Quincke needle under aseptic precautions. Standard monitoring (ECG, NIBP, SpO_2) was applied. Patients were preloaded with Ringer's lactate (10 ml/kg).

Outcome Measures

Primary outcome:

- Duration of analgesia (time to first rescue analgesia)

Secondary outcomes:

- Onset and duration of sensory and motor block
- VAS scores at predefined intervals
- Hemodynamic parameters (HR, SBP, DBP, MAP)
- Incidence of adverse effects

Pain was assessed using the Visual Analog Scale (VAS), and rescue analgesia (IV diclofenac 75 mg) was administered when VAS >3.

Statistical Analysis: Data were analyzed using Epi Info software. Continuous variables were expressed as mean ± SD and compared using ANOVA or t-test.

Categorical variables were analyzed using Chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

Results

Table 1: Demographic Characteristics

Parameter	Group A	Group B	p-value
Age (Mean ± SD)	38.2 ± 7.13	37.33 ± 7.19	1.00
Male (%)	50%	43.3%	0.796
ASA I (%)	43.3%	36.7%	0.792

Table 2: Onset of Block

Parameter	Group A	Group B	p-value
Sensory onset (min)	1.62 ± 0.15	1.90 ± 0.61	0.154
Motor onset (min)	5.02 ± 0.56	4.60 ± 0.86	0.165

Table 3: Duration Parameters

Parameter	Group A	Group B	p-value
2-segment regression (min)	139.77 ± 5.04	143.53 ± 3.30	0.001
Motor block duration (min)	154.77 ± 10.0	152.43 ± 3.15	0.354

Table 4: Duration of Analgesia

Parameter	Group A	Group B	p-value
Analgesia duration (min)	236.83 ± 9.84	278.03 ± 7.48	<0.001

Table 5: Adverse Effects

Complication	Group A (%)	Group B (%)	p-value
Hypotension	4 (13.33)	9 (30.00)	0.210
Bradycardia	1 (3.3)	4 (13.3)	0.350
Nausea/Vomiting	0 (0.00)	4 (13.3)	0.121

VAS scores were comparable initially but significantly lower in Group B at later intervals (150 min onward), indicating better analgesia.

Hemodynamic parameters remained stable throughout intraoperative and postoperative periods, as shown in tables on pages 58–70 of the thesis.

Discussion

The present study evaluated the comparative efficacy of two doses of intrathecal nalbuphine (0.4 mg and 0.8 mg) as adjuvants to hyperbaric bupivacaine in lower abdominal surgeries. The findings demonstrated that nalbuphine significantly prolongs postoperative analgesia without compromising hemodynamic stability.

In the present study, demographic variables such as age, sex, and ASA grade were comparable between both groups, indicating proper randomization. Similar findings have been reported in previous randomized studies where no significant demographic differences were observed between study groups [10].

The onset of sensory and motor block was comparable in both groups and did not show statistically significant differences. These findings are consistent with earlier studies, which reported that addition of nalbuphine does not significantly affect the onset time of spinal block [4,6].

However, the duration of analgesia was significantly prolonged in the 0.8 mg nalbuphine group compared to the 0.4 mg group. This suggests a dose-dependent prolongation of analgesic effect. Similar results have been reported by Culebras et al. and Ahmed et al., who demonstrated that higher doses of intrathecal nalbuphine significantly increase the duration of postoperative analgesia [5,7]. VAS scores in the present study were significantly lower in the 0.8 mg group at later postoperative intervals, indicating better pain control. These findings are in agreement with previous studies, which have shown improved analgesic quality and reduced pain scores with higher doses of nalbuphine [6,11].

Hemodynamic parameters including heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure remained stable throughout the intraoperative and postoperative periods in both groups. This is consistent with findings from earlier studies that reported nalbuphine as a hemodynamically stable intrathecal adjuvant [12,13].

Although the incidence of adverse effects such as hypotension, bradycardia, nausea, vomiting, pruritus, and shivering was higher in the 0.8 mg group, the difference was not statistically significant. Similar observations have been reported in previous studies, where nalbuphine demonstrated a favorable safety profile with minimal side effects [8,14].

The absence of respiratory depression in both groups further supports the safety of nalbuphine, which has been attributed to its ceiling effect on respiratory depression. Previous literature has consistently highlighted the reduced risk of respiratory complications with nalbuphine compared to other opioids [3,15]

Thus, while 0.8 mg nalbuphine provides superior analgesia, 0.4 mg appears to offer an optimal balance between efficacy and safety, making it a preferable choice in routine clinical practice.

Conclusion

Intrathecal nalbuphine is an effective adjuvant to hyperbaric bupivacaine in spinal anaesthesia. Although 0.8 mg provides longer duration of analgesia, 0.4 mg achieves optimal balance between efficacy and safety, making it the preferred dose in clinical practice.

References

1. Miller RD. Miller's Anesthesia. 9th ed. Elsevier; 2019.
2. Gan TJ. Poorly controlled postoperative pain: prevalence, consequences, and prevention. J Pain Res. 2017; 10:2287-2298.
3. Hindle A. Intrathecal opioids in acute postoperative pain management. Br J Anaesth. 2008; 8:81-85.
4. Mukherjee A, Pal A, Agrawal J, Mehrotra A, Dawar N. Intrathecal nalbuphine as an adjuvant. Anesth Essays Res. 2011; 5:171-175.
5. Culebras X, Gaggero G, Zatloukal J, Kern C, Marti RA. Intrathecal nalbuphine vs morphine. Anesth Analg. 2000; 91:601-605.
6. Jyothi B, Gowda S, Shaikh SI. Dose comparison of nalbuphine. Indian J Pain. 2014; 28:18-23.
7. Ahmed F, Narula H, Khandelwal M, Dutta D. Nalbuphine dose comparison. Indian J Pain. 2016; 30:23-28.

8. Borah TJ, Dey S, Yunus M, Dev P, Karim HM. Dose finding study of nalbuphine. Indian J Anaesth. 2018; 62:865-870.
9. Bindra TK, Kumar P, Jindal G. Nalbuphine vs fentanyl. Anesth Essays Res. 2018; 12:561-565.
10. Gomaa HM, Mohamed NN, Zoheir HA. Nalbuphine vs fentanyl. Egypt J Anesth. 2014; 30:405-410.
11. Gupta K, Rastogi B, Gupta PK. Nalbuphine vs fentanyl comparison. Indian J Pain. 2016;30: 90-95.
12. Kaushal S, Kamlakar M, Baburao JP. Nalbuphine vs buprenorphine. Med Gas Res. 2021; 11:126-130.
13. Mavaliya V, Babita, Tak ML, Singh B. Nalbuphine vs fentanyl. Bali J Anaesthesiol. 2020; 4:161-165.
14. Pradhan A, Kusumanchi R, Padhi PP. Dose comparison nalbuphine. J Evid Based Med Healthc. 2021; 8:950-955.
15. Dinesh G, Shilpa GB, Murdeshwar GN. Nalbuphine vs fentanyl. J Evol Med Dent Sci. 2021; 10:3380-3386.