Original Article

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Anaesthesia Section

Comparison of 0.75% Hyperbaric Ropivacaine Alone versus 0.75% Hyperbaric Ropivacaine with Fentanyl in Spinal Anaesthesia for Infraumbilical Surgeries: A Double-blinded Randomised Controlled Study

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ABSTRACT

Introduction: Spinal anaesthesia is preferred for infraumbilical surgeries due to its rapid onset and effective postoperative analgesia. Ropivacaine, a long-acting local anaesthetic with reduced cardiotoxicity, is increasingly used with adjuvants to enhance block characteristics. Intrathecal adjuvants like fentanyl are being increasingly used to improve or prolong the anaesthetic and analgesic effects.

Aim: To compare the effects of 0.75% hyperbaric ropivacaine alone versus 0.75% hyperbaric ropivacaine with fentanyl (25 µg) as an adjuvant in spinal anaesthesia for infraumbilical surgeries.

Materials and Methods: This randomised controlled study was conducted at tertiary care facility at the Operation Theatre (OT) complex in the Department of Anaesthesiology at Dhiraj Hospital, Smt. Bhikhibhen Kanjibhai Shah Medical Institute and Research Centre Vadodara, Gujarat, India from January 2023 to June 2024. Eighty patients undergoing elective infraumbilical surgeries were divided into two equal groups of 40 patients each. Group R (Ropivacaine only) received intrathecal 0.75% hyperbaric ropivacaine 2.5 mL+normal saline 0.5 mL, while group RF (Ropivacaine+Fentanyl) received intrathecal 0.75% hyperbaric ropivacaine 2.5 mL+fentanyl 25 µg. The parameters studied were onset and duration of sensory and motor blockade, haemodynamic changes, sedation scores, two-segment regression time, duration of analgesia, and side-effects. Statistical analysis was performed using Student's t-test and Chi-square test with p-value <0.05 considered significant.

Results: The mean age in group R was 64.5±7.2 years and group RF was 67.8±6.9 years. The time to S2 regression was significantly longer in group RF (118.8±12.8 min) compared to group R (104.5±11.2 min) (p-value <0.001). group RF achieved higher sensory block level (T8 vs T10, p-value <0.001) with shorter motor block duration (208±59 vs 282±56 minutes, p-value <0.001). VAS scores were lower in group RF (3.0±1.5 vs 4.5±1.8, p-value=0.01). Time to rescue analgesia was significantly prolonged in group RF (320±55 vs 210±45 minutes, p-value <0.001). Sedation was higher in group RF (7.5% vs 0%, p-value=0.04) with no significant haemodynamic differences.

Conclusion: Addition of intrathecal fentanyl 25 µg as an adjunct to 0.75% hyperbaric ropivacaine provides superior analgesia, shorter motor blockade, and prolonged postoperative pain relief while maintaining haemodynamic stability in comparison to intrathecal 0.75% hyperbaric ropivacaine alone.

Keywords: Intrathecal opioids, Motor blockade, Postoperative analgesia, Regional anaesthesia, Sensory blockade, Subarachnoid block

INTRODUCTION

Regional anaesthesia has revolutionised surgical practice, particularly for infraumbilical procedures, by offering numerous advantages over general anaesthesia. Spinal anaesthesia, the most commonly employed regional technique for surgeries below the umbilicus, provides rapid onset of surgical anaesthesia, excellent muscle relaxation, and profound postoperative analgesia while maintaining patient consciousness and preserving protective airway reflexes [1]. This technique has gained widespread acceptance due to its ability to reduce the stress response to surgery, minimise postoperative opioid requirements, and facilitate early ambulation, thereby reducing the incidence of postoperative complications such as deep vein thrombosis and pulmonary embolism [2].

Ropivacaine, introduced as a pure S(-) enantiomer, represents a significant advancement in regional anaesthesia due to its enhanced safety profile compared to traditional agents like bupivacaine [3,4]. This long-acting amide local anaesthetic exhibit reduced lipid solubility, resulting in decreased penetration into myelinated motor fibres and consequently less motor blockade while maintaining effective sensory anaesthesia [5-7]. The addition of dextrose (5-8%) to ropivacaine creates a hyperbaric solution with specific gravity greater than Cerebrospinal Fluid (CSF), allowing predictable cephalad spread when patients are positioned appropriately [8]. The practice of combining adjuvants with local anaesthetics in spinal anaesthesia has emerged from the need to enhance block quality, prolong duration, and reduce the required dose of local anaesthetic. Fentanyl, a highly lipophilic synthetic opioid, has become one of the most frequently used adjuvants in neuraxial anaesthesia [9,10]. Its mechanism of action involves binding to opioid receptors in the substantia gelatinosa of the spinal cord, where it modulates pain transmission without affecting sympathetic or motor function [11].

The synergistic effect of combining local anaesthetics with intrathecal opioids has been well documented in the literature [9-11]. Opioids act on the dorsal horn of the spinal cord to provide

analgesia without affecting motor or autonomic functions, while local anaesthetics block nerve conduction. This combination allows for reduced doses of each agent, potentially minimising their individual side-effects while enhancing overall anaesthetic efficacy. The rapid onset of action of fentanyl, typically within 5-10 minutes of intrathecal administration, complements the sensory blockade provided by ropivacaine [9,11,12].

Several investigators have explored the optimal dose of intrathecal fentanyl, with doses ranging from 10 to 50 µg being studied [10-13]. The dose of 25 µg has emerged as a commonly used dose that balances analgesic efficacy with a favourable side-effect profile, minimising the risk of respiratory depression, pruritus, and nausea while providing adequate enhancement of spinal block characteristics [8,10-12]. Previous studies have examined various local anaesthetic-opioid combinations for infraumbilical surgeries. Gupta K et al., demonstrated the benefits of intrathecal fentanyl with ropivacaine in infraumbilical surgery, reporting significantly prolonged duration of analgesia (335.68±22.18 minutes) compared to ropivacaine alone (240.00±28.28 minutes) [11]. Seetharam KR et al., showed prolonged analgesia with the combination, with the fentanyl group demonstrating superior postoperative pain control and reduced analgesic requirements in the first 24 hours [12]. Shashikala TK et al., compared fentanyl and dexmedetomidine as adjuvants to hyperbaric ropivacaine, concluding that both adjuvants significantly improved block characteristics compared to ropivacaine alone, with fentanyl providing faster onset and dexmedetomidine offering more prolonged sedation [8].

Despite these studies, there remains a need for further investigation into the specific combination of 0.75% hyperbaric ropivacaine with fentanyl 25 µg in the Indian population, particularly focusing on the balance between analgesic efficacy, motor block duration, and haemodynamic stability. The existing literature shows variability in outcomes based on ropivacaine concentration, baricity, fentanyl dose, and patient population characteristics [8,10-13]. Additionally, the growing emphasis on Enhanced Recovery After Surgery (ERAS) protocols has increased the importance of identifying optimal anaesthetic combinations that facilitate early ambulation while providing adequate pain control. Hence, the current study aimed to compare the effects of 0.75% hyperbaric ropivacaine alone versus 0.75% hyperbaric ropivacaine with fentanyl (25 µg) as an adjuvant in spinal anaesthesia for infraumbilical surgeries. The primary objective of the study was to compare the duration of analgesia between 0.75% hyperbaric ropivacaine alone versus 0.75% hyperbaric ropivacaine with fentanyl 25 µg in spinal anaesthesia for infraumbilical surgeries and the secondary objectives were to evaluate the onset and duration of sensory and motor blockade, monitor haemodynamic changes, determine sedative effects, measure two-segment regression time, and identify any side-effects or complications.

MATERIALS AND METHODS

This double-blinded randomised controlled study was conducted at the OT complex of Dhiraj Hospital, SBKS and MIRC in the Department of Anaesthesiology in Piparia, Waghodia, Vadodara, Gujarat, India, from January 2023 to June 2024. Institutional Ethical Committee approval was obtained (outward no: SVIECIONON/Medi/SRP/Aug/23/2) and the study was registered with Clinical Trials Registry-India (CTRI/2024/12/078277). Written informed consent was obtained from all study participants. The study received institutional ethical committee approval before patient recruitment, in accordance with Institutional and national ethical guidelines. The study protocol and patient safety measures were reviewed and approved by the committee.

Sample size calculation: The formula used was: $n=(Z\alpha/2+Z\beta)^2\times(p1(1-p1)+p2(1-p2))/(p1-p2)^2$

$n=(1.96+0.84)^2\times(0.5(1-0.5)+0.8(1-0.8))/(0.5-0.8)^2$

$n=(2.8)^2\times(0.25+0.16)/(0.09)$

$n=7.84\times0.41/0.09$ $n=35.7 \approx 36$ per group

Considering 10% dropout rate, 40 patients per group were enrolled.

Where, $Z\alpha/2$ is critical value of the normal distribution at $\alpha/2$ (at confidence level of 95%, α is 0.05, and the critical value is 1.96), and $Z\beta$ is the critical value of the normal distribution at β (for a power of 80%, β is 0.2, and the critical value is 0.84). The p1 and p2 represent the expected proportions of patients achieving adequate analgesia at 4 hours in the control and intervention groups respectively, estimated at 50% (p1=0.5) and 80% (p2=0.8) based on previous literature [12].

Inclusion criteria: Patients willing to sign written and informed consent, American Society of Anaesthesiology (ASA) Grade I, II, and III patients, age 18-65 years, scheduled for elective infraumbilical surgeries under spinal anaesthesia, and no known history of allergy, sensitivity, or other reactions to local anaesthetics of the ester and amide types.

Exclusion criteria: Patient refusal, patients with known drug allergies, cardiovascular diseases, neurological disorders, seizure disorders, clotting abnormalities, spinal deformity, local site infection, ASA grade IV patients, patients who developed inadequate block requiring conversion to general anaesthesia (sensory block <T10 at 15 minutes post-injection), and patients being taken for emergency surgeries.

Randomisation and Blinding: Randomisation was performed using computer-generated random numbers by a statistician not involved in patient care [Table/Fig-1]. The allocation sequence was concealed using sequentially numbered, opaque, sealed envelopes. The principal investigator enrolled participants. An anaesthesiologist not involved in the study prepared the study drugs in identical syringes. This was a double-blind study where both the patient and the assessing anaesthesiologist were blinded to group allocation. To reduce bias, all outcome assessments were performed by a single trained observer who was unaware of group assignment.

Study groups:

- Group R (n=40): Intrathecal 0.75% hyperbaric ropivacaine 2.5 mL+normal saline 0.5 mL (total volume 3 mL);
- Group RF (n=40): Intrathecal 0.75% hyperbaric ropivacaine 2.5 mL+fentanyl 25 µg (0.5 mL) (total volume 3 mL).

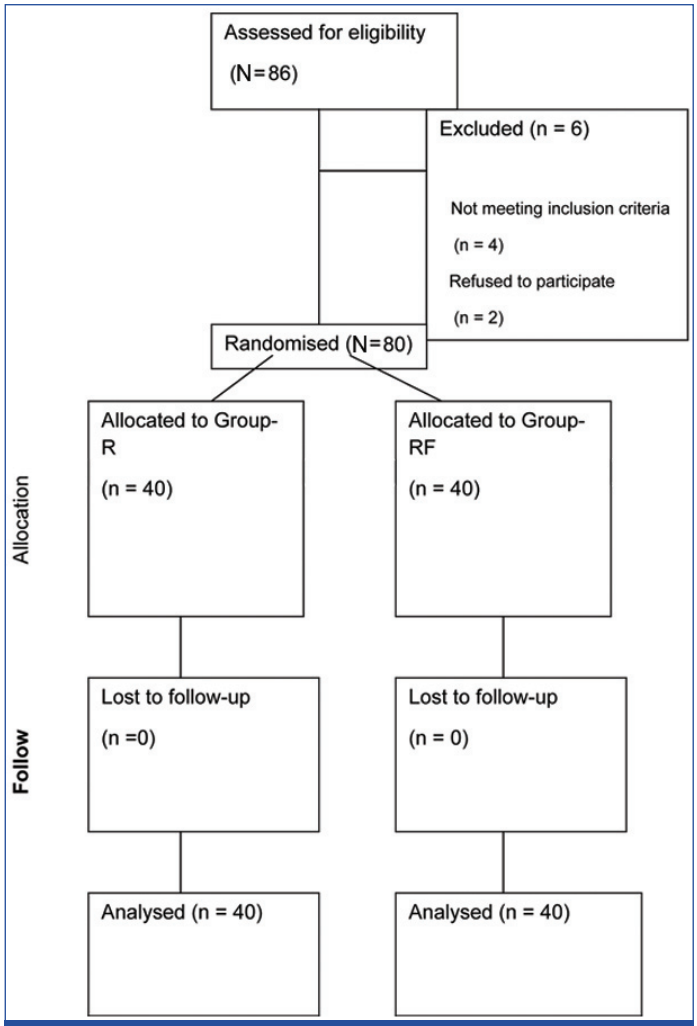
Drug dosage was based on previous studies by Gupta K et al., and Seetharam KR and Bhat G [11,12].

Study Procedure

A total of 86 patients were assessed for eligibility, of which six were excluded (4 not meeting inclusion criteria, 2 refused to participate). The remaining 80 patients were randomised into two groups of 40 each (Group R and Group RF). No patients were lost to follow-up, and all 40 patients in each group were included in the final analysis.

Preoperative assessment: The preoperative assessment included a detailed history of the patient, followed by a general and systemic examination. Baseline parameters of the patient, such as temperature, heart rate, blood pressure, oxygen saturation, and respiratory rate were recorded. Routine investigations were done, which included complete blood count, random blood sugar, renal and liver function tests, serological tests for HIV, HBsAg and HCV antibodies, electrocardiogram, and chest X-ray for all patients. All routine investigations were within normal limits for all enrolled patients. Patients were kept nil per os for six hours for solids and four hours for liquids. An intravenous (i.v.) line was secured, and patients were explained the Visual Analogue Scale (VAS) according to which pain assessment was done.

Intraoperative protocol: A multiparameter monitor was attached, and baseline vital signs were recorded. The patient was then preloaded with Ringer's lactate at a rate of 10 mL/kg 15 minutes before the procedure. Premedication with intravenous glycopyrrolate



[Table/Fig-1]: Consolidated Standard of Reporting Trials (CONSORT) flow diagram showing patient enrollment, allocation, follow-up, and analysis.

0.004 mg/kg and intravenous ondansetron 0.08 mg/kg was administered five minutes before spinal anaesthesia.

Spinal anaesthesia was performed in sitting position at L3-L4 interspace using 25G Quincke needle. After confirming free CSF flow, study drug was injected over 10-15 seconds.

Assessment parameters: Haemodynamic Assessment: Heart rate, Blood Pressure {Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP)}, SpO_2 and respiratory rate were recorded at baseline, every five minutes for first 30 minutes, then every 15 minutes until end of surgery. The SpO_2 remained stable at 98-100% in all patients throughout the procedure. Respiratory rate was maintained between 14-18 breaths per minute in both groups with no significant intergroup differences.

Sensory blockade assessment: The degree of sensory block was identified using the pin-prick approach. Onset time was defined as time from intrathecal injection to loss of pinprick sensation at T10. Duration was defined as time from intrathecal injection to regression of sensory level to S2.

Motor blockade assessment: The onset time (the duration from subarachnoid injection to grade 1 motor block) and duration (the time from intrathecal injection to the return to grade 0 motor block) of the motor block were measured using the Bromage scale.

Pain and sedation assessment: Visual Analog Scale (VAS) and Ramsay Sedation Scale were respectively used to assess pain and postoperative sedation.

Management of complications: Bradycardia was addressed with intravenous atropine sulphate (0.6 mg) if the pulse rate dropped below 60 beats per minute. Hypotension was treated with intravenous mephentermine (6 mg), when there was a fall in SBP of at least 20% below baseline. Respiratory depression was corrected with 100% oxygen for patients with a respiratory rate of fewer than 10 breaths per minute. All adverse events were recorded in the Adverse Drug Reaction (ADR) form.

Following surgery, all patients were moved to the recovery room, where their vital signs were checked, and the duration of their motor and sensory blockades was recorded. The VAS was used to measure postoperative pain. The time to rescue analgesia was also recorded.

STATISTICAL ANALYSIS

Data analysis was performed using Jamovi software. Quantitative data were expressed as mean±SD and analysed using unpaired Student's t-test. Categorical data were expressed as frequencies and analysed using Chi-square or Fisher's-exact test. The p-value <0.05 was considered statistically significant.

RESULTS

The demographic profiles of patients in both groups were comparable, with no statistically significant differences observed [Table/Fig-2]. Age, weight, gender distribution, and ASA grade were similar between groups, ensuring valid comparison of outcomes.

Groups	Group R (n=40)	Group RF (n=40)	p-value
Mean age (years)	64.5±7.2	67.8±6.9	0.63
Mean weight (kg)	69.3±9.8	71.5±10.5	0.42
Gender			
Male	22	24	0.56
Female	18	16	
ASA			
Grade I	25 (62.5%)	23 (57.5%)	0.72
Grade II	12 (30%)	14 (35%)	
Grade III	3 (7.5%)	3 (7.5%)	

[Table/Fig-2]: Demographic characteristics of study participants (N=80).
Unpaired student's t-test for continuous variables; Chi-square test for categorical variables; p-value <0.05 statistically significant; p-value <0.001** statistically highly significant

Both groups demonstrated comparable onset of sensory and motor blockade, with no significant differences. However, group RF achieved significantly higher sensory block levels and shorter motor block duration [Table/Fig-3].

Parameters	Group R (n=40)	Group RF (n=40)	p-value
Sensory block			
Sensory blockade onset at T10 (min)	4.8±1.5	5.5±1.6	0.08
Highest sensory level	T10 (T8-T10)	T8 (T6-T10)	<0.001**
Duration of sensory block (min)	280±58	290±64	0.31
Motor block			
Onset to Bromage 1 (min)	4.2±1.3	3.8±1.1	0.09
Maximum motor block achieved	39/40 (97%)	38/40 (94%)	0.52
Duration of motor block (min)	282±56	208±59	<0.001**

[Table/Fig-3]: Sensory and motor blockade characteristics (N=80).
Unpaired student's t-test and Chi-square test; p-value <0.05 statistically significant; p-value <0.001** statistically highly significant*

Both groups maintained haemodynamic stability throughout the procedure with no clinically significant differences in MAP, SBP, DBP, or heart rate [Table/Fig-4,5].

Group RF demonstrated significantly better analgesic profiles and prolonged duration of analgesia compared to group R [Table/Fig-6].

Sedation scores showed significantly higher sedation in group RF, though all patients maintained adequate consciousness [Table/Fig-7].

The incidence of side-effects was minimal in both groups with no statistically significant differences [Table/Fig-8].

Parameters	Group R (n=40)	Group RF (n=40)	p-value
Mean MAP (mmHg)	88±7	86±6	0.34
Mean SBP (mmHg)	118±12	116±10	0.42
Mean DBP (mmHg)	72±8	70±7	0.38
Mean HR (bpm)	75±8	73±7	0.41

[Table/Fig-4]: Haemodynamic parameters comparison.
Unpaired student's t-test; p-value <0.05 statistically significant; p-value <0.001** statistically highly significant

Parameters	Time	Group R (n=40)	Group RF (n=40)	p-value
Heart Rate (bpm)	Baseline	78±10	76±9	0.35
	5 min	76±9	74±8	0.29
	10 min	74±8	73±8	0.56
	15 min	75±8	73±7	0.24
	30 min	75±8	73±7	0.25
	45 min	76±7	74±7	0.21
	60 min	76±8	74±7	0.23
MAP (mmHg)	Baseline	92±8	91±7	0.55
	5 min	88±7	87±7	0.52
	10 min	86±7	85±6	0.49
	15 min	87±7	86±6	0.48
	30 min	88±7	86±6	0.17
	45 min	89±7	87±6	0.16
	60 min	89±7	87±6	0.15
SpO_2 (%)	Baseline	99.2±0.8	99.1±0.9	0.62
	5 min	99.1±0.9	99.0±0.8	0.59
	15 min	99.0±0.8	98.9±0.9	0.58
	30 min	99.0±0.9	98.8±0.8	0.30
	60 min	99.1±0.8	98.9±0.9	0.28
Respiratory Rate (breaths/min)	Baseline	16.2±1.8	16.0±1.7	0.61
	5 min	15.8±1.6	15.6±1.5	0.56
	15 min	15.6±1.5	15.4±1.6	0.55
	30 min	15.5±1.4	15.2±1.5	0.35
	60 min	15.6±1.5	15.3±1.4	0.36

[Table/Fig-5]: Haemodynamic parameters at different time intervals.
Unpaired Student's t-test; p-value <0.05 statistically significant; p-value <0.001** statistically highly significant

Parameters	Group R (Mean±SD)	Group RF (Mean±SD)	p-value
Two-segment regression (min)	104.5±11.2	118.8±12.8	<0.001
Duration of analgesia (min)	210±45	320±55	<0.001
Postoperative VAS score	4.5±1.8	3.0±1.5	0.01 (S)
Time to rescue analgesia (min)	210±45	320±55	<0.001 (HS)

[Table/Fig-6]: Postoperative block characteristics and analgesia.

Sedation Level	Group R (n=40)	Group RF (n=40)	p-value
Ramsay Score 1	35 (87.5%)	30 (75%)	0.04 (S)
Ramsay Score 2	5 (12.5%)	7 (17.5%)	
Ramsay Score ≥3	0 (0%)	3 (7.5%)	
Mean Ramsay Score	1.13±0.34	1.33±0.62	

[Table/Fig-7]: Sedation score distribution.

Side-effects	Group R	Group RF	p-value
Nausea	0	1 (2.5%)	0.31
Vomiting	0	1 (2.5%)	0.31
Hypotension	1 (2.5%)	0	0.31

[Table/Fig-8]: Side-effects and complications.
Fisher's-exact test; p-value <0.05 considered statistically significant

DISCUSSION

The demographic profiles of both groups were comparable, ensuring that observed differences in outcomes were attributable to the anaesthetic regimen rather than patient factors. The mean age, weight, gender distribution, and ASA grades were similar between the two groups, establishing a solid foundation for comparing the efficacy of the two anaesthetic regimens.

The present study revealed significantly superior analgesic profiles in the ropivacaine-fentanyl group, with lower VAS scores both intraoperatively and postoperatively (3.0±1.5 vs 4.5±1.8, p-value=0.01). This finding is consistent with the mechanism of action of intrathecal fentanyl, which binds to mu-opioid receptors in the dorsal horn of the spinal cord, enhancing the analgesic effect of local anaesthetics without significantly affecting motor function. Singh AP et al., reported VAS scores of 1.2±0.6 in their RF group versus 2.1±0.8 in the ropivacaine-alone group at two hours postsurgery [10]. Seetharam KR et al., demonstrated comparable results with mean VAS scores of 1.5±0.7 in the RF group versus 2.8±1.2 in the control group at four hours postoperatively [12].

The prolonged time to rescue analgesia in the present study RF group (320±55 minutes vs 210±45 minutes) corroborates findings from multiple studies. Bhatia M et al., reported rescue analgesia times of 462.41±38.42 minutes with RF versus 320.56±15.32 minutes with ropivacaine alone [13]. Gupta K et al., found similar prolongation with rescue analgesia at 335.68±22.18 minutes in the fentanyl group versus 240.00±28.28 minutes in the control group [11]. The approximately 52% prolongation in time to rescue analgesia observed in our study (320 vs 210 minutes) represents a clinically meaningful difference that can significantly impact postoperative patient comfort and reduce the burden on nursing staff for pain management.

The present study found that group RF achieved a higher sensory block level (T8 vs T10, p-value <0.001). Shashikala TK et al., reported median block heights of T8 with ropivacaine-fentanyl versus T10 with ropivacaine alone in 90 patients undergoing infraumbilical surgeries [8]. However, Koltka K et al., observed lower sensory levels with ropivacaine-fentanyl combinations in their study using different patient positioning (lateral vs sitting position), different injection speeds, and isobaric versus hyperbaric solutions, which may explain the discrepancy [14]. Specifically, Koltka K et al., reported that the median sensory block level reached T10 in their ropivacaine-fentanyl group compared to T8 in the bupivacaine-fentanyl group, attributing this difference to the lower potency of ropivacaine compared to bupivacaine and the use of isobaric solutions [14].

The significantly shorter motor block duration in the present study RF group (208±59 vs 282±56 minutes) represents a crucial clinical advantage. Bhatia M et al., reported motor block durations of 192.20±17.36 minutes with RF versus 240.00±20.99 minutes with ropivacaine alone [13]. This finding aligns with the differential blockade property of ropivacaine, which preferentially blocks sensory fibres over motor fibres. The addition of fentanyl enhances analgesia through a different mechanism (opioid receptor activation) without prolonging motor blockade, thus allowing earlier patient mobilisation. This characteristic is particularly valuable in the context of ERAS protocols, where early ambulation is associated with reduced postoperative complications and shorter hospital stays [15].

Both groups maintained excellent haemodynamic stability throughout the procedure, with no significant differences in MAP or heart rate. Rawal P et al., reported stable haemodynamics in both groups with similar MAP values (87±8 vs 85±7 mmHg) [16]. The haemodynamic stability observed in both groups can be attributed to the lower cardiotoxicity profile of ropivacaine compared to other local anaesthetics like bupivacaine. Additionally, the intrathecal dose of fentanyl (25 µg) used in the current study is known to have minimal systemic effects, contributing to the stable cardiovascular parameters observed.

The higher incidence of mild sedation in the present study RF group (7.5% vs 0%) aligns with findings by Haneesh Moya J et al., who reported sedation scores of 1.8±0.5 in the fentanyl group compared to 1.2±0.3 in the control group [17]. The minimal incidence of other side-effects, including the absence of pruritus, supports the safety of the 25 µg fentanyl dose used. The low incidence of opioid-related side-effects such as pruritus, respiratory depression, and nausea/vomiting (2.5%) confirms that the 25 µg dose of intrathecal fentanyl represents an optimal balance between efficacy and safety.

The clinical implications of these findings are significant for perioperative care. The combination of 0.75% hyperbaric ropivacaine with fentanyl 25 µg offers several advantages: enhanced intraoperative anaesthesia with higher sensory block levels ensuring adequate surgical anaesthesia, prolonged postoperative analgesia reducing the need for systemic analgesics, shorter motor block duration facilitating early ambulation and reducing the risk of deep vein thrombosis, and maintained haemodynamic stability minimising the need for vasopressor support. These characteristics make this combination particularly suitable for day-care surgery settings and ERAS protocols where rapid recovery and early discharge are prioritised.

Future studies should explore the use of this combination in specific surgical populations, such as elderly patients or those with significant comorbidities, to further define its safety and efficacy profile. Additionally, comparison with other adjuvants such as dexmedetomidine, clonidine, or magnesium sulfate would help establish the relative benefits of different intrathecal adjuvant combinations.

Limitation(s)

The present study has several limitations. The single-centre design limits generalisability. The present study did not evaluate long-term outcomes or patient satisfaction scores. The study was not powered to detect rare adverse events. Future multicentre randomised controlled trials with larger sample sizes and longer follow-up periods are needed to confirm these findings.

CONCLUSION(S)

The addition of fentanyl 25 µg to 0.75% hyperbaric ropivacaine in spinal anaesthesia for infraumbilical surgeries provides superior analgesia compared to ropivacaine alone. The combination results in prolonged duration of analgesia, reduced motor blockade duration facilitating early mobilisation, and maintained haemodynamic stability. These findings support the use of this combination as a valuable option for infraumbilical procedures, particularly in the context of ERAS protocols.

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