

**A Comparative Study of Intrathecal 0.75% Heavy Ropivacaine with Fentanyl and 0.5% Heavy Levobupivacaine with Fentanyl in Lower Abdominal Surgeries****K. Lakshmana Rao<sup>1</sup>, Ch. V. V. Siva Kumar<sup>2</sup>, Kambhampati Ravi<sup>3</sup>**<sup>1</sup>Assistant Professor, Dept. of Anaesthesia, Government Medical College, Rajamahendravaram.<sup>2</sup>Associate Professor, Dept. of General Surgery, Government Medical College, Rajamahendravaram.<sup>3</sup>Associate Professor, Dept. of General Surgery, Government Medical College, Rajamahendravaram.

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Conflict of interest: Nil

**Abstract****Introduction:** The aim of the study was to compare the efficacy of intrathecal ropivacaine-fentanyl (RF) with levo bupivacaine-fentanyl (LF) in lower abdomen surgeries, focusing on factors such as sensory and motor block duration, patient recovery times, and discharge readiness.**Methods:** The study included individuals aged 18-60 requiring elective lower abdominal or limb surgery (ASA I or II). Randomly assigned to RF or LF groups, RF received intrathecal 0.75% Ropivacaine with 25µg Fentanyl, while LF received 0.5% Levo Bupivacaine with 25µg Fentanyl. Sensory and motor block durations were assessed to compare efficacy.**Results:** The gender ratio was 1.27, 1.08 and mean age was  $46.09 \pm 8.23$ ,  $49.12 \pm 5.22$  respectively in groups; no significant difference. In the RF group the duration of sensory block was  $122.4 \pm 33.1$  and it was  $142.2 \pm 31.6$  in the LF group; statistically there was significant difference. The degree of motor block was 86% and 100%, respectively.**Conclusion:** The demographic similarity and varied efficacy observed between RF and LF groups underscore the complexity of anesthesia management. While gender ratio and mean age uniformity enhance internal validity, differences in sensory and motor block durations necessitate tailored approaches to optimize perioperative outcomes and patient safety.**Key words:** Intrathecal, anesthesia, ropivacaine, bupivacaine, efficacy.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

In today's surgical field, the majority of operations are conducted as day care procedures, prioritizing patient convenience and efficiency. Advancements in anesthesia and minimally invasive techniques have revolutionized outpatient surgery, significantly reducing recovery times. [1]

Levo Bupivacaine, a newer long-acting local anesthetic, is increasingly favored in clinical practice for its reduced cardiovascular and CNS toxicity compared to traditional bupivacaine. This safer profile is advantageous for ambulatory surgeries requiring rapid recovery and discharge. Williams et al. [2] highlight that Levo Bupivacaine's reduced side effects result in better patient outcomes and quicker recovery. However, spinal bupivacaine can still cause prolonged motor block, delaying home discharge and requiring extended observation. [3] Thus, while Levo Bupivacaine is promising, its use must balance safety benefits with potential discharge delays.

Ropivacaine offers effective sensory block with early motor recovery, making it ideal for ambulatory surgeries. It works by reversibly inhibiting sodium ion influx, blocking nerve impulse conduction. Its improved safety profile, featuring lower central nervous system and cardiovascular toxicity, enhances its appeal over bupivacaine. [4]. This reduced toxicity is particularly significant in outpatient settings where rapid recovery and discharge are crucial. [5] Consequently, ropivacaine is increasingly favored in clinical practice for its balance of efficacy and safety. With this a study was conducted to compare the efficacy of intrathecal ropivacaine-fentanyl (RF) with levo bupivacaine-fentanyl (LF) in the lower abdomen surgeries.

**Methods:**

It was a prospective, study, conducted in the department of Anaesthesia. Study was conducted between February to April 2023. Study protocol was approved by the Institutional Ethics Committee.

Informed written consent was taken from the study members.

Inclusion criteria encompass individuals of both genders aged 18 to 60 years who require elective lower abdominal or lower limb surgery and are classified as American Society of Anesthesiologists (ASA) grades I or II. Exclusion criteria include individuals with known hypersensitivity to local anesthetics, those with medical complications such as anemia, severe heart disease, severe hypertension, severe hypovolemia, shock, or septicemia, those with a local infection at the proposed site for spinal anesthesia, individuals of extreme age, and non-cooperative individuals.

As per the protocol, venous blood was aseptically collected for analysis of complete blood picture (CBP), liver function test (LFT), renal function test (RFT), random blood sugar (RBS), bleeding time, clotting time, blood grouping, Rh typing, serum electrolytes, coagulation profile, HIV, and HbsAg. Additionally, complete urine examination (CUE), ECG, and Chest X-ray were conducted concurrently.

In a randomized allocation, participants were divided into two groups: RF and LF. Group RF received intrathecal administration of 3ml of 0.75% heavy Ropivacaine with 0.5ml of 25 µg Fentanyl, while group LF received 3ml of 0.5% heavy Levo Bupivacaine with 0.5ml of 25µg Fentanyl. The study assessed the duration of sensory block (DSB), defined as the time from injection to either regression of pinprick sensation or the first requirement of analgesics. Additionally, the degree of motor block (DMB) was evaluated, representing the time from intrathecal injection to the regression of motor block based on the intrathecal Bromage score reaching 0. [6] These parameters were crucial in comparing the efficacy and duration of action between the two anesthetic agents.

**Statistical analysis:** Statistical analysis was performed by using SPSS software version 20.0 and MS excel-2007. Descriptive data were tabulated as mean  $\pm$  standard deviation and percentages. The Chi-square test was used to assess the association among various categorical variables. For all statistical analyses  $P < 0.05$  was considered statistically significant.

### Results:

Total 100 members were included; 50 in each group. The gender ratio was 1.27, 1.08 and mean age was  $46.09 \pm 8.23$ ,  $49.12 \pm 5.22$  respectively in groups; no significant difference. In the RF group the DSB was  $122.4 \pm 33.1$  and it was  $142.2 \pm 31.6$  in the LF group; statistically there was significant difference. The degree of motor block was 86% and 100%, respectively.

### Discussion:

Rao *et al.*

In this research, the gender ratio and mean age, comparable between RF and LF groups, underscore the demographic similarity in the study cohort. A gender ratio of 1.27 and 1.08 in RF and LF groups, respectively, reflects a slight male predominance in both groups, though not statistically significant. [7, 8] Similarly, the mean ages of  $46.09 \pm 8.23$  and  $49.12 \pm 5.22$  years in RF and LF groups, respectively, show no significant difference. [9, 10] This demographic uniformity across groups is pivotal in minimizing confounding variables that could influence study outcomes. Consistency in gender distribution aids in reducing gender-based biases, ensuring equitable representation in the study population. [7] Likewise, similarity in mean ages mitigates age-related variations in response to interventions, enhancing the comparability of study findings. [9] Overall, the absence of significant differences in gender ratio and mean age between RF and LF groups strengthens the internal validity of the study results. However, it's crucial to interpret these findings within the context of the specific research aims and potential confounders.

The significant difference in the DSB between the RF and LF groups underscores the varied efficacy of the interventions. With a mean duration of  $122.4 \pm 33.1$  minutes in the RF group and  $142.2 \pm 31.6$  minutes in the LF group, this finding suggests potential implications for clinical practice. [11, 12] Such variations in DSB could stem from differences in drug pharmacokinetics or anatomical considerations between the two groups. [13, 14] Understanding these disparities is crucial for tailoring anesthesia regimens to individual patient needs and optimizing perioperative outcomes. These findings highlight the importance of meticulous monitoring and management of sensory block duration, particularly in procedures where precise timing is critical for patient comfort and safety. Further research into the underlying mechanisms driving these differences is warranted to inform evidence-based anesthesia practices.

The contrasting degrees of motor block between the two groups, with 86% in the RF group and 100% in the LF group, indicate significant differences in motor function impairment following anesthesia administration. Such variations could stem from the pharmacological properties of the anesthetic agents used or individual patient responses to the intervention. [12, 14] The observed 100% motor block in the LF group suggests a more profound impairment, potentially prolonging postoperative recovery times and impacting ambulation and patient mobility (Jones *et al.*, 2019). In contrast, the 86% motor block in the RF group may allow for earlier motor recovery, facilitating quicker return to baseline function and potentially reducing the risk of complications associated with prolonged immobilization. [13] These findings underscore the

importance of carefully titrating anesthesia to achieve the desired balance between sensory and motor block, considering individual patient factors and surgical requirements. Further research into the factors influencing motor block duration and intensity is warranted to optimize perioperative outcomes and enhance patient safety and satisfaction.

The demographic similarity and varied efficacy observed between RF and LF groups underscore the complexity of anesthesia management. While gender ratio and mean age uniformity enhance internal validity, differences in sensory and motor block durations necessitate tailored approaches to optimize perioperative outcomes and patient safety.

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