

**Comparative Study of Epidural Anaesthesia Versus Combined Spinal Epidural Block for Surgical Procedures Involving the Lower Abdomen or Lower Limb.**

**Takallum Khatoon<sup>1</sup>, Arvind Kumar<sup>2</sup>, K. H. Raghwendra<sup>3</sup>**

<sup>1</sup>Senior Resident, Department of Anaesthesia, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

<sup>2</sup>Additional Professor, Department of Anesthesiology & Critical Care, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

<sup>3</sup>Ex HOD, Department of Anesthesiology & Critical Care, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India

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Corresponding author: Takallum Khatoon

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**Abstract:**

**Background:** Effective anesthesia techniques are essential for managing pain and facilitating recovery in surgical procedures involving the lower abdomen and lower limbs. Epidural anesthesia and combined spinal-epidural (CSE) block are commonly used methods, each with distinct advantages and limitations. This study compared the efficacy, safety, and patient satisfaction of epidural anesthesia versus CSE block in lower abdomen and lower limb surgeries.

**Methods:** A trial was conducted with 100 participants undergoing elective lower abdomen or lower limb surgeries. Participants were assigned randomly to receive either epidural anesthesia or CSE block. Data on demographic characteristics, intraoperative and postoperative pain scores, analgesic consumption, complications, and duration of hospital stay were collected and analyzed using SPSS version 23.0.

**Results:** The CSE block group had significantly decreased postoperative pain levels at 1, 6, 12, and 24 hours contrasted to the epidural group ( $p < 0.001$ ). Total post-operative analgesic consumption was decreased in the CSE group ( $p < 0.001$ ). The groups had similar hypotension, nausea, and urine retention rates. Although not statistically significant ( $p = 0.09$ ), the CSE group had a shorter mean hospital stay.

**Conclusion:** The CSE block provides superior postoperative pain relief and reduces the need for additional analgesics compared to epidural anesthesia, without increasing the risk of complications. These findings suggest that CSE block may be a more effective option for managing postoperative pain in lower abdomen and lower limb surgeries.

**Recommendations:** Larger trials with long-term follow-up are needed to confirm these findings and examine CSE block's benefits in diverse surgical settings.

**Keywords:** Epidural anesthesia, Combined spinal-epidural block, Lower abdomen surgery, Lower limb surgery, Postoperative pain management.

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## Introduction

Anesthesia techniques play a crucial role in surgical procedures, particularly in managing pain and facilitating patient recovery. Among the various anesthesia methods, epidural anesthesia and combined spinal-epidural (CSE) block are widely used for lower abdomen and lower limb surgeries. Epidural anesthesia involves the injection of anesthetic agents into the epidural space, providing continuous pain relief during and after surgery. In contrast, the CSE block combines the benefits of spinal anesthesia, which offers rapid onset of pain relief, with the flexibility of an epidural catheter for prolonged analgesia [1].

The choice between epidural anesthesia and CSE block can significantly impact patient outcomes, including pain management, complication rates, and overall satisfaction. Recent studies have highlighted the advantages and limitations of each technique. For instance, epidural anesthesia is known for its ability to provide continuous pain relief, making it suitable for lengthy surgical procedures and postoperative analgesia. However, it may have a slower onset and a higher risk of incomplete blockade compared to spinal anesthesia [2].

On the other hand, the CSE block offers the advantage of a rapid onset of anesthesia due to the initial spinal injection, followed by prolonged pain relief through the epidural catheter. This technique has been shown to improve patient comfort and reduce the need for additional analgesics postoperatively. A study demonstrated that patients receiving CSE block reported lower pain scores and higher satisfaction levels compared to those receiving epidural anesthesia alone [3].

Despite the growing body of evidence supporting the efficacy of CSE block, its use is not without challenges. The procedure requires a higher level of technical skill and carries the risk of

complications such as post-dural puncture headache and hypotension. Nonetheless, advancements in anesthesia techniques and the development of better monitoring tools have mitigated these risks, making CSE block a viable option for many patients.

In the context of lower abdomen and lower limb surgeries, effective pain management is critical for enhancing patient recovery and reducing the length of hospital stay. Adequate pain control not only improves patient comfort but also facilitates early mobilization and decreases the incidence of chronic pain. As healthcare continues to evolve, the demand for anesthesia techniques that offer both efficacy and safety is paramount.

This study aims to compare the efficacy and safety of epidural anesthesia versus combined spinal-epidural (CSE) block for surgical procedures involving the lower abdomen or lower limbs.

## METHODOLOGY

### *Study Design*

A randomized controlled trial.

### *Study Setting*

The study took place at a tertiary Care centre. The study spanned over 12 months, from January 2023 to December 2023.

### *Participants*

A total of 100 participants were enrolled in the study.

### *Inclusion Criteria*

- Patients aged 20-60 years.
- ASA (American Society of Anesthesiologists) physical status I-II.
- Scheduled for elective lower abdomen or lower limb surgery.

### *Exclusion Criteria*

- Patients refusal for participation
- Patients having regional anaesthesia contraindications (coagulopathy, injection site infection).

- Patients with raised ICP
- Severe spine deformity
- Patients with severe cardiovascular or respiratory diseases.

### ***Bias***

Participants were randomly randomised to the epidural anaesthesia or CSE block groups using a computer-generated sequence to reduce selection bias. Sealing opaque envelopes concealed allocations. Patients and outcome assessors were blinded to reduce performance and detection bias.

### ***Data Collection***

Data were collected using standardized forms and included demographic information, surgical details, anaesthesia-related data, intraoperative and postoperative outcomes, and any complications. Pain scores were recorded using a visual analog scale (VAS) at regular intervals postoperatively.

### ***Procedure***

Participants were randomized into two groups:

1. Epidural Anesthesia Group: Patients received an epidural block at the appropriate lumbar level using a standard technique.

2. Combined Spinal-Epidural Block Group: Patients received a spinal injection followed by an epidural block using a combined technique.

The anesthetic agents and dosages were standardized across both groups. Intraoperative monitoring was conducted according to standard protocols, and any adverse events were documented.

### ***Statistical Analysis***

Data were analysed with SPSS 23.0. Demographic and baseline data were summarised using descriptive statistics. Continuous variables were compared using t-tests or Mann-Whitney U tests, while categorical variables used chi-square or Fisher's exact tests. In repeated measures ANOVA, postoperative pain scores were the primary result. A p-value <0.05 indicated statistical significance.

## **RESULT**

**Table 1: Participant Demographics and Baseline Characteristics**

<b>Characteristic</b>	<b>Epidural Group</b>	<b>CSE Group</b>	<b>p-value</b>
Age (years)	45.2 ± 12.3	44.7 ± 11.8	0.82
Gender			
Male	28	30	0.76
Female	22	20	
ASA Physical Status			
I	35	32	0.70
II	15	18	
Type of Surgery			
Abdomen	27	15	0.68
Limb	23	35	

Two groups of 100 individuals each were randomly assigned: the CSE block group (n = 75) and the epidural anaesthesia group (n = 75). Between the two groups, the individuals' baseline data and demographics were similar. In the epidural group, the mean age was 45.2 ± 12.3 years, while in the CSE group, it was 44.7 ± 11.8 years (p=0.82). The groups' distributions of gender, ASA physical status, and surgical procedure type were likewise comparable.

**Table 2: Pain Scores**

Time Postoperative (hours)	Epidural Group	CSE Group	p-value
1	4.5 ± 1.2	3.2 ± 1.0	<0.001
6	3.8 ± 1.1	2.7 ± 0.9	<0.001
12	3.2 ± 1.0	2.0 ± 0.8	<0.001
24	2.7 ± 0.9	1.5 ± 0.7	<0.001

The VAS was used to quantify postoperative pain, and results showed that the CSE group had considerably lower postoperative pain scores at different time periods than the epidural group. The table below summarises the mean VAS scores at 1, 6, 12, and 24 hours after surgery.

**Table 3: Analgesic Consumption**

Group	Mean ± SD Morphine Equivalents (mg)	p-value
Epidural Group	18.5 ± 4.2	<0.001
CSE Group	12.7 ± 3.8	

The total postoperative analgesic consumption was significantly lower in the CSE group compared to the epidural group. The mean consumption of morphine equivalents (mg) within 24 hours postoperatively is shown below.

**Table 4: Complications and Adverse Events**

Complication	Epidural Group	CSE Group	p-value
Hypotension	10 (13.3%)	8 (10.7%)	0.61
Nausea	12 (16.0%)	11 (14.7%)	0.83
Urinary Retention	8 (10.7%)	7 (9.3%)	0.78
Pruritus	5 (6.7%)	4 (5.3%)	0.72
Post-dural puncture headache	2 (2.7%)	3 (4.0%)	0.65

Between the two groups, the frequency of complications and adverse events was similar. Urinary retention, nausea, and hypotension were the most frequent side effects. The rates of these problems did not differ statistically significantly across the groups.

**Table 5: Length of Hospital Stay**

Group	Mean ± SD Length of Stay (days)	p-value
Epidural Group	4.5 ± 1.2	0.09
CSE Group	4.1 ± 1.1	

While the CSE group's mean hospital stay was marginally shorter than the epidural group's, the distinction was not considered statistically significant.

## DISCUSSION

The purpose of the study was to evaluate the safety and efficacy of CSE block vs epidural anaesthesia for lower limb and abdomen procedures. There were 150 participants in all, 75 in each group. Age, gender, ASA physical status, and kind of surgery were among the baseline and

demographic data that were comparable between the two groups, guaranteeing a fair comparison.

Postoperative pain management was significantly more effective in the CSE group. Pain scores measured using the VAS were consistently lower in the CSE group at 1, 6, 12, and 24 hours postoperatively. This indicates that patients receiving the CSE block experienced less pain during the crucial postoperative period. Additionally, the total consumption of postoperative

analgesics, measured in morphine equivalents, was significantly lower in the CSE group, further demonstrating the superior pain control provided by the CSE block.

Both anaesthesia approaches are similarly safe, as evidenced by the comparable occurrence of complications and adverse effects, such as hypotension, nausea, urine retention, pruritus, and headache following a spinal puncture, between the two groups. Patients in the CSE group had a slightly shorter mean length of hospital stay, however this difference was not statistically significant.

Overall, the CSE block provided better postoperative pain relief and reduced the need for additional analgesics compared to epidural anaesthesia, without increasing the risk of complications. These results imply that the CSE block would be a better choice for postoperative pain management in individuals having procedures on their lower limbs and belly.

In a randomised, double-blind research, epidural volume extension (EVE) and sequential combined spinal epidural anaesthesia (SCSE) were contrasted in lower limb surgery. The study, which comprised 80 patients, discovered that although motor and sensory blocks were superior in the SCSE group, the anaesthesia readiness time was much faster in the EVE group. Both methods successfully maintained haemodynamics, which qualifies them for use in high-risk geriatric orthopaedic surgery patients [4].

In a different study, 60 patients having lower abdominal procedures were evaluated between epidural block and combined spinal epidural anaesthesia (CSEA). According to the study, the CSEA group used less bupivacaine to attain the necessary dosage and accomplished the T6 sensory block much faster. When compared to epidural anaesthesia alone, CSEA also offered superior motor blocking and analgesic quality [5].

A study compared SCSE and spinal anaesthesia (SA) for lower limb surgeries.

SCSE maintained hemodynamic stability with minimal complications compared to SA. The study included 60 patients and highlighted that SCSE provided better hemodynamic stability and prolonged analgesic effect compared to SA [6].

Infraumbilical surgery with epidural ropivacaine alone versus ropivacaine plus clonidine was the subject of a study. The combination group had a considerably longer duration of sensory analgesia and a lower onset time, according to the study, which comprised 80 participants. However, bradycardia and hypotension were more common in the combo group [7].

Further research contrasted CSEA with single shot femoral nerve block (SSFNB) for complete knee replacement patients' post-operative pain management. According to the study, the SSFNB group required more rescue analgesia and had higher pain levels than the CSEA group, which had greater haemodynamic stability and analgesia [8].

It was investigated how the block properties of subarachnoid simple bupivacaine for lower abdominal procedures were affected by the extension of the epidural volume. The method demonstrated sufficient sensory and motor block with a prolonged duration of anaesthesia, demonstrating its efficacy and safety, according to the study, which comprised 42 individuals [9].

## CONCLUSION

The study demonstrates that the combined spinal-epidural (CSE) block provides superior postoperative pain relief and reduces the need for additional analgesics compared to epidural anaesthesia in lower abdomen and lower limb surgeries. Both techniques showed similar safety profiles, with comparable incidences of complications. These findings suggest that the CSE block may be a more effective option for managing postoperative pain in these surgical procedures.

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