International Journal of Health Sciences and Research
[Indexed, Peer-Reviewed Journal]
Volume 16; Issue: 4; April 2026
Website: www.ijhsr.org
ISSN: 2249-9571

Original Research Article

Comparison of Spinal Anaesthesia with Lumbar and Sacral Plexus Block for Hip Fracture Surgeries - An Observational Study from Northeast India

Sourav Saha[1], Rajib Debnath[2], Ambhrin Saha[3], Kangchai Chaudhuri[4*]

[1]Assistant Professor, Department of Anaesthesiology, TMC & Dr. BRAM Teaching Hospital, Agartala, Tripura, India
[2]Associate Professor, Department of Orthopaedics, TMC & Dr. BRAM Teaching Hospital, Agartala, Tripura, India
[3]Assistant Professor, Department of Anaesthesiology, TMC & Dr. BRAM Teaching Hospital, Agartala, Tripura, India
[4]Associate Professor, Department of Anaesthesiology, TMC & Dr. BRAM Teaching Hospital, Agartala, Tripura, India

[*]Corresponding author: Dr. Kangchai Chaudhuri

DOI: https://doi.org/10.52403/ijhsr.20260420

ABSTRACT

Background: Hip fractures are becoming a bigger health issue worldwide, especially for older adults with comorbidities. The type of anaesthesia used can have a major impact on outcomes during and after surgery. While Spinal anaesthesia (SA) is commonly used, it often leads to sympathetic blockade and hemodynamic instability. The lumbar–sacral plexus block (LSPB) is an alternative technique that may contribute to greater stability of autonomic functions.
Aim: The aim of the study was to compare the efficacy of a combined lumbar sacral block and subarachnoid block in patients undergoing hip fracture surgeries.
Methods: This observational study enrolled 50 patients undergoing hip fracture surgery, who were randomly assigned to the SA or LSPB groups (n=25 each). Hemodynamic parameters (Systolic and Diastolic blood pressure, Heart rate), analgesic requirements and general anaesthesia conversion were assessed at fixed perioperative time points. Statistical analysis was performed using repeated-measures ANOVA.
Results: LSPB maintained significantly higher systolic and diastolic blood pressure values than SA ($p<0.001$), with marked hypotension after induction. Heart rate trends showed bradycardia in SA patients, while LSPB preserved stable rates ($p=0.002$). Analgesic supplementation was required in LSPB cases, whereas none in the SA group needed it ($p<0.01$). Conversion to general anaesthesia was rare and not statistically significant between groups ($p=0.48$). Among all perioperative complications, hypotension was the most common, accounting for 18% of cases.
Conclusion: LSPB offers better hemodynamic stability and postoperative analgesic benefits than SA, making it a good option for elderly or high-risk patients. SA remains a dependable choice for anaesthesia during surgery, but LSPB offers cardiovascular safety and a smoother recovery.

Keywords: Hip fracture surgery, Spinal anaesthesia, Lumbar–sacral plexus block, Haemodynamic stability, Northeast India

INTRODUCTION

The global burden of hip fractures continues to rise, particularly among the ageing population, with over 1.6 million cases reported annually. Driven by population ageing, the incidence is projected to exceed 6 million by 2050. These fractures are among the most common orthopaedic emergencies in older adults, and their incidence is increasing due to longer life expectancy and higher osteoporosis rates. This condition imposes a substantial burden on healthcare systems, as it is associated with increased morbidity, prolonged hospitalisations, and higher mortality rates.[1]

Most hip fracture cases need surgical intervention, typically performed under neuraxial or general anaesthesia. These patients are frequently older, frail, and present with comorbidities such as cardiovascular or pulmonary disease, which increases the risk of postoperative complications. Common adverse outcomes include delirium, myocardial infarction, pneumonia, stroke, and increased mortality.[2]

The selection of anaesthetic technique is pivotal in influencing perioperative outcomes, especially in frail patients with multiple comorbidities. Spinal anaesthesia (SA) is often preferred for hip fracture surgeries because of its rapid onset, reliable analgesia, and straightforward administration.[3] However, concerns regarding hemodynamic instability and complications in high-risk patients have prompted exploration of alternative regional techniques such as lumbar and sacral plexus blocks (LSPB).[4]

SA induces a dense neuraxial blockade by administering local anaesthetic into the subarachnoid space, resulting in profound sensory and motor block. Although this technique provides optimal surgical conditions, it also produces sympathetic blockade, which may result in hypotension, bradycardia, and decreased cardiac output.[5] These effects are particularly detrimental in elderly patients with limited physiological reserve, cardiovascular disease, or pre-existing autonomic dysfunction. Moreover, SA carries risks of post-dural puncture headache, urinary retention, and transient neurological symptoms.[6] Despite these drawbacks, its simplicity and widespread familiarity among Anaesthesiologists have maintained its status as the gold standard for hip fracture surgeries.

In contrast, lumbar and sacral plexus blocks are peripheral nerve blocks that selectively anaesthetise the nerves supplying the hip joint and surrounding structures. Peripheral nerve blocks directed at the lumbar plexus (femoral, obturator, and lateral femoral cutaneous nerves) and sacral plexus (sciatic nerve) provide effective analgesia while minimising the extensive sympathetic blockade associated with neuraxial techniques.[7] The use of a peripheral nerve stimulator (PNS) or ultrasound guidance has enhanced the accuracy and safety of these procedures, thereby reducing the risk of vascular or neural injury.[8] LSPB is associated with greater hemodynamic stability, which makes it a favourable option for patients with cardiovascular compromise or contraindications to spinal anaesthesia.[9]

Another important consideration is postoperative pain management. Effective analgesia is crucial for early mobilisation, prevention of complications such as deep vein thrombosis, and overall functional recovery. SA provides strong pain relief during surgery, but its effects do not last long, so patients often need systemic opioids after the procedure.[10] Unlike spinal anaesthesia, LSPB can be continued using catheter techniques. This approach offers longer-lasting pain relief and helps lower the need for opioids.[11] It was observed that regional blocks were associated with a lower incidence of postoperative delirium, a common complication in elderly hip fracture patients, further supporting their role in enhancing recovery.[12]

Although LSPB has clear advantages, it is technically challenging and needs a high level of skill in PNS or ultrasound-guided regional anaesthesia. If the block is incomplete or does not adequately cover the

surgical area, additional pain relief or a switch to general anaesthesia may be needed.[13] There are also some rare risks, such as nerve injury, hematoma, and local anaesthetic toxicity. Because of these factors, its broader use depends on thorough training, adequate resources, and careful patient selection.

There is a paucity of studies from the Northeastern region on this subject, which motivated us to conduct the present research. The aim of the study was to compare the efficacy of a combined lumbar sacral block and subarachnoid block in patients undergoing hip fracture surgeries.

METHODOLOGY

1. Study type:

This was an observational study.

2. Study design and setting:

This observational study was conducted in the Department of Anaesthesiology at a tertiary care centre.

3. Study period:

The duration of the study was six months.

4. Ethical considerations:

Ethical approval was taken from the Institutional Ethics Committee (IEC) prior to commencement. Written informed consent was obtained from all participants who voluntarily agreed to participate in the study.

5. Sample size and subjects:

A simple consecutive sampling technique was employed. A total of 50 patients of either sex was enrolled.

6. Group allocation:

The 50 patients were randomly assigned into two groups: Group LSPB (lumbar and sacral plexus block) and Group SAB (spinal anaesthesia block), with 25 patients in each group.

7. Sampling technique:

Simple random sampling.

8. Study Subjects:

A total of 50 patients of either sex presenting with hip fractures and meeting the eligibility criteria were enrolled in the study.

Inclusion Criteria

- Patients with well-controlled respiratory and cardiovascular disease
- Elective hip fracture surgeries
- Age range: 35–80 years
- Body weight between 40–85 kg
- ASA physical status classification I, II, or III

Exclusion Criteria

- Known allergy to local anaesthetic agents
- Presence of infection at the intended injection site
- Refusal to participate in the study
- Patients with documented coagulopathy

9. Data Collection Procedure

All patients were kept nil per os (NBM) for a minimum of six hours prior to surgery. Upon arrival in the operating theatre, an intravenous cannula was inserted and intravenous fluids were initiated. Baseline vital parameters—including heart rate, blood pressure, and peripheral oxygen saturation (SpO_2)—were recorded. Each patient received standard premedication consisting of 1 mg of midazolam.

Procedure for Spinal Anaesthesia

The subarachnoid block was administered with the patient in the sitting position. Using a 25-gauge spinal needle, the puncture was performed at the L3–L4 interspace following local infiltration with 2% lignocaine and adherence to strict aseptic precautions. After confirming free flow of cerebrospinal fluid, 2.5 ml of 0.5% heavy bupivacaine hydrochloride was injected into the subarachnoid space.

Capdevila's Approach for Lumbar Plexus Block

A line was first drawn connecting the spinous processes. The posterior superior iliac spine (PSIS) was identified, and from this point, a line parallel to the spinous process line was

extended cranially. An intercristal line, joining the highest points of both iliac crests, was then marked. The entry site for the lumbar plexus block was determined at the junction of the medial two-thirds and lateral one-third of the segment of the intercristal line lying between the two previously drawn lines.

At this point, a stimulating needle was introduced with the nerve stimulator set to 1.5 mA, an impulse duration of 0.1 ms, and a frequency of 1 Hz until contact with the transverse process was achieved. The needle was then advanced 1–2 cm beyond the transverse process, either cranially or caudally, using the "walk-off" technique, until quadriceps femoris muscle contractions were elicited. The current was gradually reduced to 0.5 mA, ensuring that contractions were present at 0.5 mA.

Following negative aspiration, a mixture of 15 ml of 0.5% levobupivacaine, 10 ml of 1.5% lignocaine with adrenaline, and 4 mg of dexamethasone was administered.

Approach for Sacral Plexus Block

The block was performed with the patient maintained in the same position. A stimulating needle was inserted perpendicularly through the gluteal muscle, approximately 6 cm caudal to the line joining the PSIS and the ischial tuberosity, until contact with the sacral plate was achieved. The correct placement was confirmed by observing motor responses, such as plantar or dorsiflexion of the foot.

Following negative aspiration, a mixture consisting of 10 ml of 0.5% levobupivacaine, 10 ml of 1.5% lignocaine with adrenaline, and 4 mg dexamethasone was administered.

For intraoperative hypotension, injection maphentermine was used. If additional intraoperative analgesia was required, ketamine (0.5 mg/kg) and dexmedetomidine (0.5 mcg/kg/hr) were administered.

Data Analysis

The collected data were compiled and entered into a Microsoft Excel spreadsheet, then exported to the SPSS software package (Version 23) for statistical evaluation. Continuous variables were presented as mean ± standard deviation, while categorical variables were summarised as frequencies and percentages. The effect of time and group (LSPB and Spinal) on each measure of systolic blood pressure, diastolic blood pressure, and heart rate was assessed using repeated-measures analysis of variance (ANOVA). Analysis was conducted at fixed time points for each subject, i.e. 15, 30, 45, 60, 75, 90, 105, and 120 minutes to capture the effects of time and group. For other types of categorical data, Fisher's exact test was used. A p-value less than 0.05 was considered statistically significant.

RESULTS

Figure 1 shows the socio-economic distribution among the 50 participants. The majority were older adults, with more than half (52%) aged 60 years or older, 26% aged 46–60 years, and 22% aged 30–45 years. Gender distribution was nearly balanced, with 48% males and 52% females. Participants were equally divided between the two intervention groups, LSPB and spinal anaesthesia, each accounting for 50%. Regarding complications, most participants (70%) did not experience any adverse effects. However, hypotension was the most common complication observed (18%), followed by pain (6%), bradycardia (4%), and epidural spread (2%).

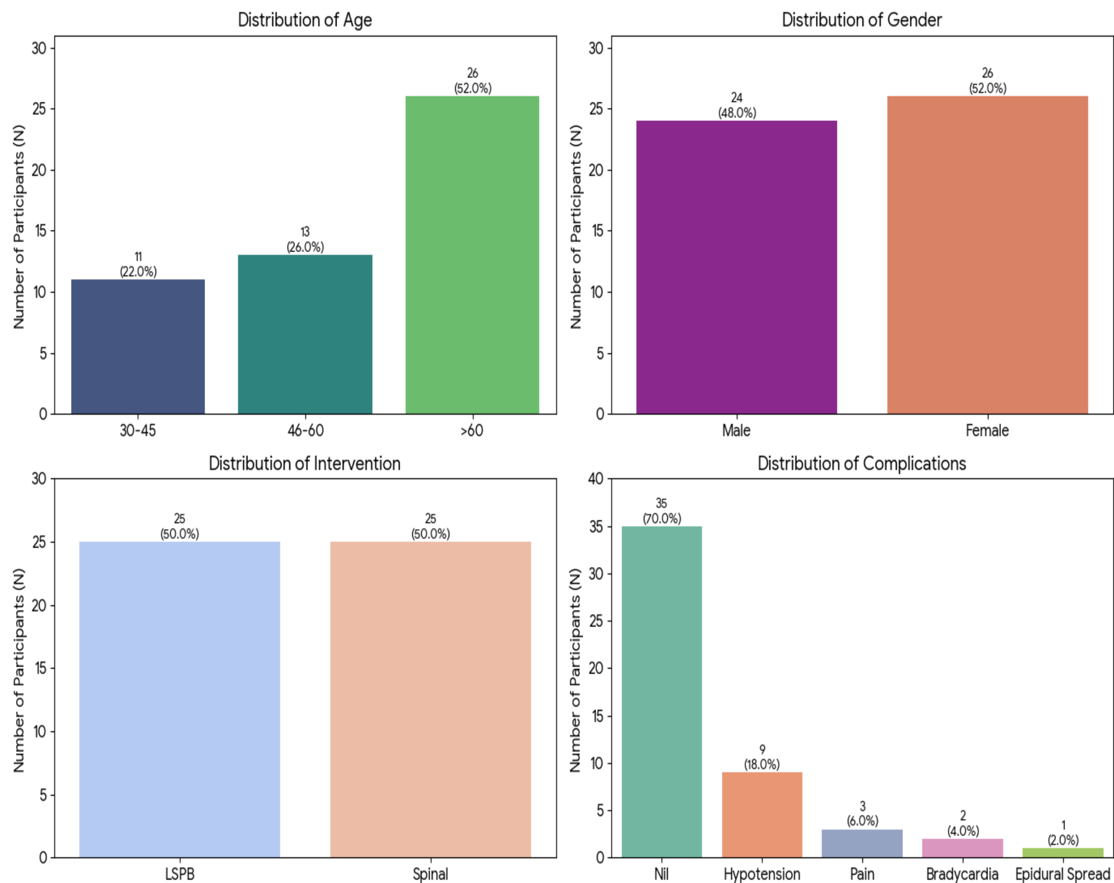

Figure 1: Socio-demographic and Clinical Characteristics of Participants

Table 1 compares systolic blood pressure (SBP) trends between patients receiving an LSPB and those receiving SA at different time points. At baseline, both groups had comparable SBP values (130.4 ± 10.9 mmHg in LSPB vs. 135.5 ± 14.0 mmHg in SA). However, after induction, a clear divergence emerged. In the LSPB group, SBP remained consistently stable, hovering around 136–139 mmHg throughout the 120-minute observation period, with only minor fluctuations. In contrast, the SA group showed a sharp decline at 15 and 30 minutes (102.5 ± 12.7 and 102.0 ± 10.4 mmHg, respectively), reflecting significant hypotension. Although SBP gradually improved over time in the SA group, reaching 119.7 ± 8.1 mmHg at 120 minutes, it never matched the stability observed in the LSPB group.

Table 1: Comparison of Systolic Blood Pressure Between LSPB and SA Groups

Time Point	LSPB Group (mmHg)	SA Group (mmHg)
Baseline	130.4 ± 10.9	135.5 ± 14.0
15 min	139.7 ±7.9	102.5 ± 12.7
30 min	139.2 ± 10.3	102.0 ± 10.4
40 min	139.3 ± 10.7	107.1 ± 6.9
60 min	137.0 ± 8.8	107.2 ± 7.4
75 min	136.5 ± 8.9	111.5 ± 6.5
90 min	136.1 ± 7.5	113.8 ± 5.9
105 min	136.7 ± 6.8	117.5 ± 7.6
120 min	137.5 ± 6.5	119.7 ± 8.1

Table 2 compares diastolic blood pressure (DBP) trends between patients receiving an LSPB and those receiving SA at different time points. At baseline, both groups had nearly identical DBP values (81.7 ± 4.7 mmHg vs. 81.2 ± 6.8 mmHg), showing no initial difference. From 15 minutes onward, however, a clear separation emerged: the LSPB group consistently maintained stable DBP values in the range of 81–86 mmHg, while the SA group experienced a marked fall, dropping to as low as 66.0 ± 5.1 mmHg at 40 minutes. Although the SA group gradually recovered over time, their DBP remained significantly lower than LSPB until the 105-minute mark. By 120 minutes, the SA group's DBP had improved to 79.4 ± 5.7 mmHg, narrowing the gap with LSPB (82.1 ± 3.6 mmHg).

Table 2: Comparison of Diastolic Blood Pressure Between LSPB and SA Groups

Time Point	LSPB Group (mmHg)	SA Group (mmHg)
Baseline	81.7 ± 4.7	81.2 ± 6.8
15 min	86.6 ± 5.2	70.0 ± 8.8
30 min	86.0 ± 6.3	66.1 ± 6.2
40 min	85.5 ± 7.2	66.0 ± 5.1
60 min	84.0 ± 7.3	69.1 ± 5.7
75 min	81.8 ± 5.8	70.6 ± 6.2
90 min	82.3 ± 3.4	73.1 ± 5.6
105 min	81.6 ± 2.7	74.4 ± 6.7
120 min	82.1 ± 3.6	79.4 ± 5.7

Table 3 compares heart rate (HR) trends between patients receiving LSPB and those under SA across different perioperative time points. At baseline, both groups had similar HR values (81.6 ± 9.1 vs 85.1 ± 10.2), indicating no significant difference. In the LSPB group, heart rate steadily increased after induction, peaking around 96.7 ± 10.9 at 60 minutes, and then remained stable in the range of 93–96 beats per minute throughout the observation period. In contrast, the SA group demonstrated a gradual decline in HR after 15 minutes, dropping to 80.1 ± 13.5 at 90 minutes, with only slight recovery to 82.2 ± 11.7 by 120 minutes.

Table 3: Comparison of Heart Rate Between LSPB and SA Groups

Time Point	LSPB Group (HR)	SA Group (HR)
Baseline	81.6 ± 9.1	85.1 ± 10.2
15 min	92.2 ± 9.9	88.7 ± 19.2
30 min	94.3 ± 9.3	85.5 ± 16.1
40 min	95.3 ± 10.6	81.5 ± 15.6
60 min	96.7 ± 10.9	80.4 ± 15.8
75 min	95.3 ± 10.7	81.0 ± 15.3
90 min	95.4 ± 11.1	80.1 ± 13.5
105 min	94.2 ± 11.2	80.7 ± 13.6
120 min	93.7 ± 9.9	82.2 ± 11.7

Table 4 presents the repeated-measures ANOVA results for SBP, DBP, and HR, enabling a scientific interpretation of the haemodynamic differences between LSPB and SA.

- **Systolic Blood Pressure:** The effect of time was highly significant ($F=20.12$, $p<0.001$, partial $\eta^2=0.30$), indicating SBP varied across the observation period. The group effect was extremely strong ($F = 147.05$, $p < 0.001$, partial $\eta^2 = 0.75$), indicating that LSPB consistently maintained higher SBP than SA. The significant time × group interaction ($F = 53.40$, $p < 0.001$, partial $\eta^2 = 0.53$) confirms that the two groups followed distinct SBP trajectories over time.

- **Diastolic Blood Pressure:** Time had a significant influence ($F=9.74$, $p<0.001$, partial $\eta^2=0.17$), while the group effect was also strong ($F=94.73$, $p<0.001$, partial $\eta^2=0.66$), demonstrating that LSPB preserved higher DBP values. The interaction effect ($F=28.57$, $p<0.001$, partial $\eta^2=0.37$) indicates that the pattern of DBP changes differed significantly between groups, with SA showing pronounced hypotension.
- **Heart Rate:** Time significantly affected HR ($F=4.73$, $p<0.001$, partial $\eta^2=0.09$), though the effect size was smaller compared to blood pressure. The group effect ($F=10.55$, $p=0.002$, partial $\eta^2=0.18$) revealed that SA patients tended toward bradycardia, while LSPB maintained more stable rates. The interaction ($F=12.46$, $p<0.001$, partial $\eta^2=0.21$) further supports that HR trends over time differed between the two anaesthetic techniques.

Table 4: Repeated Measures ANOVA Analysis of Haemodynamic Parameters (Systolic BP, Diastolic BP, and Heart Rate) in LSPB versus SA Groups

Variable	Effect of Time (F, p-value)	Partial η^2	Effect of Group (F, p-value)	Partial η^2	Time × Group Interaction (F, p-value)	Partial η^2
Systolic BP	F = 20.12, p = < 0.001*	0.30	F = 147.05, p = <0.001*	0.75	F = 53.40, p =< 0.001*	0.53
Diastolic BP	F = 9.74, p = < 0.001*	0.17	F = 94.73, p = <0.001*	0.66	F = 28.57, p = < 0.001*	0.37
Heart Rate	F = 4.73, p = < 0.001*	0.09	F = 10.55, p = 0.002*	0.18	F = 12.46, p = < 0.001*	0.21

Figure 2 shows a comparison of analgesic requirements between the two groups, revealing a significant difference. In the LSPB group, 7 participants required additional analgesics, while none in the SA group needed them. Conversely, 18 participants in the LSPB group and all 25 in the SA group did not require any supplementary analgesia. This difference was statistically significant ($p < 0.01$).

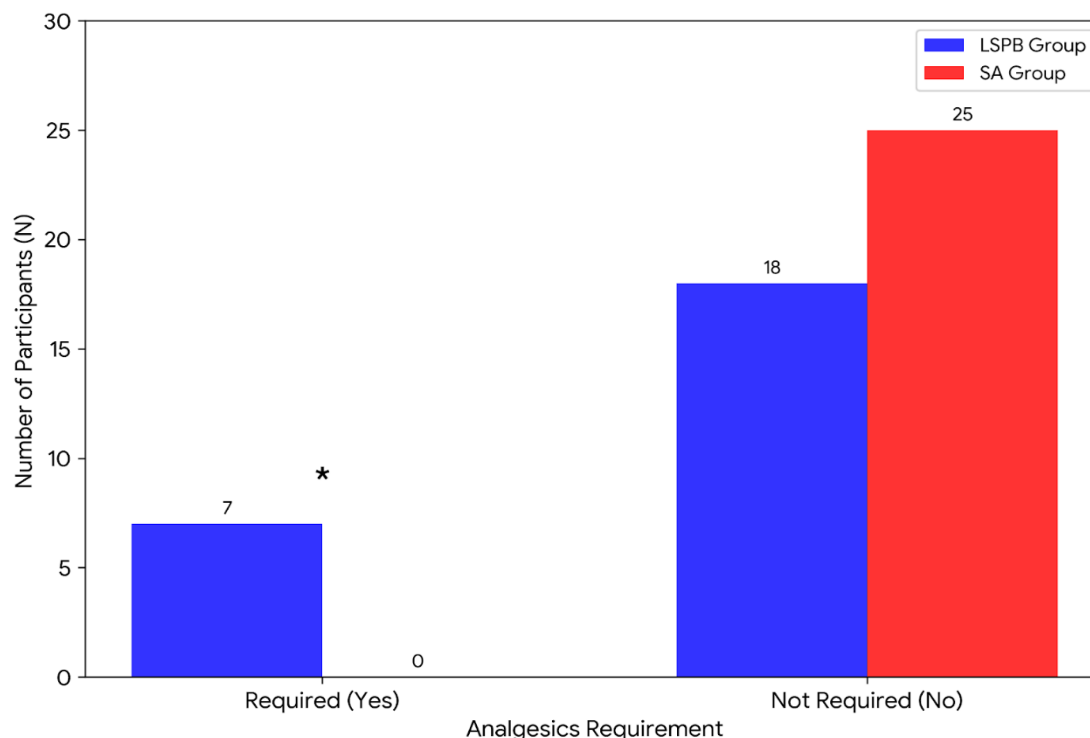

Figure 2: Comparison of Analgesic Requirements Between Groups

Figure 3 demonstrates that the comparison of general anaesthesia (GA) conversion between the two groups shows no statistically significant difference. In the LSPB group, 2 participants required conversion to GA, while none in the SA group did. However, the majority in both groups—23 in LSPB and all 25 in SA—did not require conversion. This difference was not statistically significant (p=0.48).

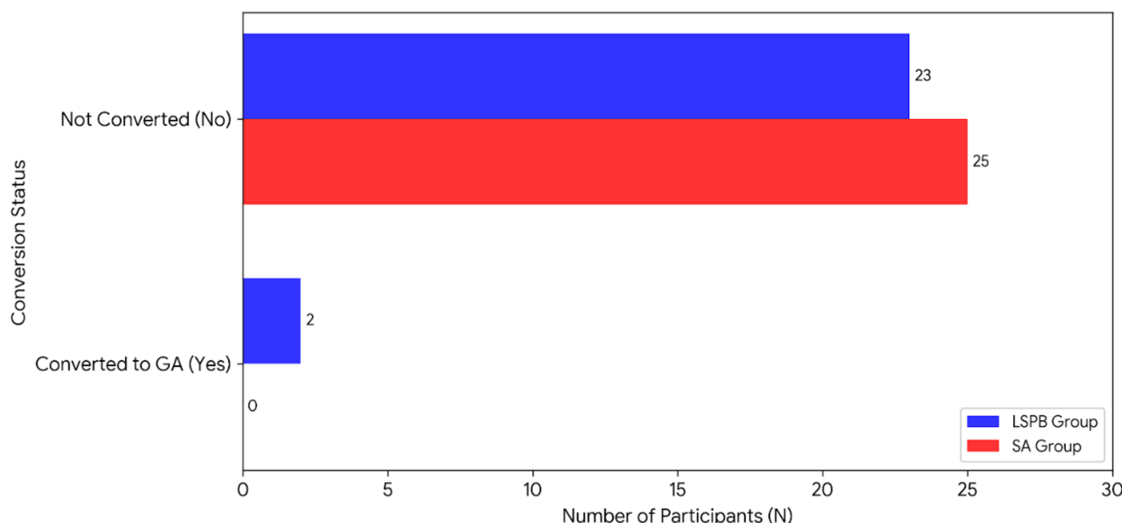

Figure 3: Comparison of General Anaesthesia Conversion Between Groups

DISCUSSION

The present study compared SA with LSPB in hip fracture surgery, highlighting differences in haemodynamic stability, analgesic requirements, and conversion rates to general anaesthesia. The results demonstrated that LSPB maintained significantly higher systolic and diastolic blood pressure values compared to SA, which showed marked reductions after 15 minutes. This supports recent evidence that peripheral nerve blocks reduce haemodynamic fluctuations in elderly patients, thereby lowering the risk of intraoperative hypotension and bradycardia.[14,15]

The haemodynamic advantage of LSPB is particularly relevant in frail patients with cardiovascular comorbidities. A prospective observational study by Dalal et al. showed that in elderly patients with hip fractures, lumbar plexus block provided safer haemodynamic profiles than neuraxial techniques, thereby reducing perioperative morbidity.[16] Similarly, a 2025 review emphasised that combined LSPB preserve autonomic stability, making them suitable for high-risk patients undergoing hip surgery.[17] These findings align with our results, in which hypotension was the most frequent complication in the SA group, whereas LSPB patients largely remained stable.

Heart rate trends in our study further reinforce this advantage. SA patients consistently had lower heart rates after 30 minutes, whereas LSPB patients maintained higher heart rates. This divergence reflects the bradycardic tendency of SA, which has been linked to sympathetic blockade.[18] In contrast, LSPB avoids extensive autonomic disruption, thereby reducing the risk of perioperative cardiac events. Such stability is crucial in elderly populations, where even minor haemodynamic disturbances can precipitate myocardial infarction or stroke.[19]

Analgesic requirements revealed an important distinction. While SA provided dense intraoperative analgesia, a subset of LSPB patients required supplementary analgesics. This observation is consistent with reports that incomplete coverage of the surgical field is a limitation of plexus blocks.[20]

Conversion to GA was rare in both groups, with no statistically significant difference between them. This finding suggests that both techniques are generally effective, though the technical expertise required for LSPB remains a limiting factor. Earlier studies report that the PNS and ultrasound-guided technique improve accuracy and safety but require advanced training and resources.[21] In resource-limited settings, this requirement may restrict widespread adoption despite clinical benefits.

The complication profile in our study also underscores the relative safety of LSPB. While SA carried risks of hypotension and bradycardia, LSPB was associated with fewer systemic complications. This aligns with evidence that peripheral nerve blocks reduce perioperative morbidity and blood loss compared to neuraxial techniques.[22] However, rare risks such as nerve injury or local anaesthetic toxicity remain concerns, underscoring the importance of careful patient selection and adherence to safety protocols.[23]

These results add to the evidence that LSPB can be a good alternative to SA for hip fracture surgeries, especially for patients with heart problems. While SA remains the standard because it is simple and reliable, LSPB offers more stable blood pressure and better postoperative pain control. The choice of anaesthetic should depend on the patient's health, the team's experience, and the available resources.

Limitations

- Small sample size, limiting generalisability.
- Single-centre settings, which may not reflect broader clinical practice.
- Observational design without long-term follow-up on functional recovery.
- Technical expertise required for LSPB may restrict reproducibility in resource-limited settings.
- Postoperative outcomes such as delirium and rehabilitation were not comprehensively assessed.

CONCLUSION

This study indicates that a lumbar–sacral plexus block offers better hemodynamic stability and postoperative pain control than spinal anaesthesia for hip fracture surgery. While spinal anaesthesia remains the gold standard due to its simplicity and reliability, LSPB is particularly advantageous in elderly and cardiovascularly compromised patients. Wider adoption of LSPB requires enhanced training, resource availability, and multicentric trials to validate its efficacy across diverse populations.

Declaration by Authors

Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Zhang J, Wang X, Zhang H, Shu Z, Jiang W. Comparison of combined lumbar and sacral plexus block with sedation versus general anaesthesia on postoperative outcomes in elderly patients undergoing hip fracture surgery (CLSB-HIPELD): study protocol for a prospective, multicentre, randomised controlled trial. BMJ Open. 2019 Mar 30;9(3):e022898. doi: 10.1136/bmjopen-2018-022898.
2. Kunutsor SK, Hamal PB, Tomassini S, Yeung J, Whitehouse MR, Matharu GS. Clinical effectiveness and safety of spinal anaesthesia compared with general anaesthesia in patients undergoing hip fracture surgery using a consensus-based core outcome set and patient-and public-informed outcomes: a systematic review and meta-analysis of randomised controlled trials. Br J Anaesth. 2022 Nov;129(5):788-800. doi: 10.1016/j.bja.2022.07.031.
3. Kalaria RT, Upadhyay MR. Spinal anaesthesia for lower abdominal surgery: levobupivacaine versus racemic bupivacaine. Journal Of Clinical And Diagnostic Research. UC09-UC13. 10.7860/JCDR/2018/31422.11327.

4. Shah RB, Desai SB, Gajjar VA, Soni D, Prajapati V. Combined lumbar-sacral plexus block for surgical anesthesia in high risk patients (ASA grade III/IV) undergoing lower limb surgeries. Ann Anesth Pain Med 2020; 3(1): 1008.
5. Joseph M. Neal. Hypotension and bradycardia during spinal anesthesia: Significance, prevention, and treatment. Techniques in Regional Anesthesia and Pain Management, Volume 4, Issue 4, 2000, Pages 148-154, https://doi.org/10.1053/trap.2000.20600.
6. Apan A, Cuvaş Apan Ö. Complications in Spinal Anaesthesia [Internet]. Topics in Spinal Anaesthesia. InTech; 2014. https://doi.org/10.5772/58817
7. Muse IO, Deiling B, Grinman L, Hadeed MM, Elkassabany N. Peripheral Nerve Blocks for Hip Fractures. J Clin Med. 2024;13(12):3457. doi: 10.3390/jcm13123457.
8. Feng J, Tang G, Shui Y, Xiang J, Qin Z. Effects of ultrasound-guided lumbar plexus and sacral plexus block combined with general anesthesia on the anesthetic efficacy and surgical outcomes in elderly patients undergoing intertrochanteric fracture surgery: a randomized controlled trial. J Orthop Surg Res. 2024;19(1):171. doi: 10.1186/s13018-023-04469-y.
9. Patel SH, Mehta KH, Panchal SB, Garaniya RR, Chauhan DR. Comparison of lumbar sacral plexus block with spinal anesthesia in high-risk patients scheduled for hip surgeries. Int J Adv Biomed Sci. 2021;23(37):146-157. https://doi.org/10.48165/ijabms.2021.233712
10. Stevens RD, Van Gessel E, Flory N, Fournier R, Gamulin Z. Lumbar plexus block reduces pain and blood loss associated with total hip arthroplasty. Anesthesiology. 2000;93(1):115-121. doi: 10.1097/00000542-200007000-00021.
11. Singhal A, Taksande K. Continuous Catheter Techniques Versus Single-Injection Nerve Blocks: A Comprehensive Review of Postoperative Pain Management Strategies. Cureus. 2024;16(9):e70040. doi: 10.7759/cureus.70040.
12. Lim EJ, Koh WU, Kim H, Kim HJ, Shon HC, Kim JW. Regional Nerve Block Decreases the Incidence of Postoperative Delirium in Elderly Hip Fracture. J Clin Med. 2021 Aug 15;10(16):3586. doi: 10.3390/jcm10163586.
13. Yi R, Li Z, Yang X, Huang T, Liu H, Zhang J. The Utilization of Ultrasound-Guided Regional Nerve Blocks in Anesthetic Management for Fracture Surgery. J Pain Res. 2025 Jan 20; 18:353-366. doi: 10.2147/JPR.S492151.
14. Ajay Kumar, Vaibhav Mane, Nusrat Anjum. A Comparative Study Between the Lumbar Plexus Block and Low Spinal with Conventional Spinal Anaesthesia in Hip Surgeries. Acta Medica International 12(3):, Sep 2025.
15. Coviello A, Cirillo D, Bernasconi A, de Siena AU, Spasari E, Barone MS, Piccione I, Ranieri G, Tognù A, Servillo G, Iacovazzo C. Peripheral nerve blocks vs selective spinal anesthesia in patients with femur fracture: a patient-, surgeon-, and assessor-blinded randomized controlled study. J Anesth Analg Crit Care. 2025 Dec 3;5(1):88. doi: 10.1186/s44158-025-00302-6.
16. Shital Dalal, Sanjivani Diliprao Khandare, Dipakkumar Hiralal Ruparel. An Impact and Outcome of Lumbar Plexus Block in Elderly Patients with Hip Fractures: a Prospective Observational Study. Res. J. Med. Sci., 17: 131-136, doi: 10.59218/makrjms.2023.10.131.136
17. Cao Z. Lumbar plexus combined with sacral plexus nerve block anesthesia in elderly patients undergoing hip surgery. Eur J Med Res. 2025 Oct 21;30(1):995. doi: 10.1186/s40001-025-02917-5.
18. Lacey JR, Dubowitz JA, Riedel B. Asystole following spinal anaesthesia: the hazards of intrinsic cardiac reflexes. Anaesth Rep. 2022 Dec 5;10(2):e12198. doi: 10.1002/anr3.12198.
19. Pan WT, Ji MH, Ma D, Yang JJ. Effect of perioperative autonomic nervous system imbalance on surgical outcomes: a systematic review. Br J Anaesth. 2025 Sep;135(3):608-622. doi: 10.1016/j.bja.2025.06.004.

20. Bottomley T, Gadsden J, West S. The failed peripheral nerve block. BJA Educ. 2023;23(3):92-100.
21. Bhagora P, Shah U, Sutariya H. Ultrasound-guided vs peripheral nerve stimulator-guided peripheral nerve blocks: a comparative study of techniques, outcomes, and patient satisfaction. Int J Curr Pharm Rev Res. 2025;17(3):824-827.
22. Guay J. The effect of neuraxial blocks on surgical blood loss and blood transfusion requirements: a meta-analysis. J Clin Anesth. 2006 Mar;18(2):124-8. doi: 10.1016/j.jclinane.2005.08.013.
23. Bais K, Guirguis F, Guirguis M. Nerve Injury Following Regional Nerve Block: A Literature Review of Its Etiologies, Risk Factors, and Prevention. Curr Pain Headache Rep. 2024 Sep;28(9):863-868. doi: 10.1007/s11916-024-01268-w.

How to cite this article: Sourav Saha, Rajib Debnath, Ambhrin Saha, Kangchai Chaudhuri. Comparison of spinal anaesthesia with lumbar and sacral plexus block for hip fracture surgeries - an observational study from Northeast India. *Int J Health Sci Res.* 2026; 16(4):156-166. DOI: *https://doi.org/10.52403/ijhsr.20260420*

******