Original Research Paper

Volume - 16 | Issue - 08 | August - 2026 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anaesthesiology

EFFICACY OF SPINAL ANAESTHESIA VERSUS GENERAL ANAESTHESIA FOR LUMBAR UNILATERAL LAMINECTOMY WITH BILATERAL DECOMPRESSION: A COMPARATIVE STUDY

Nidhi Punia*	Department of Anaesthesiology, JLN Hospital, Nagaur, Rajasthan, India *Corresponding Author
Riddhmaan Singh Poonia	Department of Radiodiagnosis, Meenakshi Medical College Hospital and Research Institute, Kanchipuram, Tamil Nadu, India
Ranjeet Singh Choudhary	Department of Orthopaedics (Spine Surgery), JLN Hospital, Nagaur, Rajasthan, India
Hardik Meena	Department of Anaesthesiology, Government Medical College, Kota, Rajasthan, India

ABSTRACT **Background:** Spinal anaesthesia (SA) is increasingly being utilized as a possible alternative to general anaesthesia (GA) for lumbar spine surgeries. This study compares the efficacy of SA over GA for lumbar unilateral laminectomy with bilateral decompression. **Methods:** This prospective comparative study includes 60 patients (ASA I–II) divided into two groups: SA (n = 30) and GA (n = 30). The patients are assessed for the following parameters: intraoperative blood loss, haemodynamic stability, duration of surgery, duration of postoperative analgesia, and perioperative complications. **Results:** Net blood loss during surgery was significantly lower in the SA group (100 ± 35 ml) in comparison to the GA group (240 ± 40 ml; P < 0.05). Duration of postoperative analgesia was significantly longer in the SA group (240 ± 45 min) versus the GA group (140 ± 10 min; P < 0.001). Haemodynamic stability was better maintained in the SA group. The incidence of postoperative nausea and vomiting (PONV) was higher in the GA group (13.3% vs. 3.3%).**Conclusion:** Spinal anaesthesia is a safe and effective alternative to GA for lumbar decompression surgeries, offering reduced blood loss, superior postoperative analgesia, and better haemodynamic stability.

KEYWORDS :

INTRODUCTION

Lumbar unilateral laminectomy with bilateral decompression is a commonly performed procedure for degenerative lumbar spine conditions such as lumbar canal stenosis. General anaesthesia has traditionally been the choice of anaesthesia technique for such surgeries. However, spinal anaesthesia is increasingly being utilized as a possible alternative.

Spinal anaesthesia offers several additional advantages, including superior haemodynamic stability, reduced intraoperative blood loss, and better postoperative analgesia in comparison to general anaesthesia. In fact, avoidance of airway manipulation also reduces the prevalence of complicacies such as postoperative nausea and vomiting (PONV).[1–4]

The intent of this study is to assess and compare the adequacy of spinal anaesthesia with general anaesthesia in patients undergoing lumbar unilateral laminectomy with bilateral decompression.

Methods

This prospective comparative study was conducted in a tertiary care hospital. It was run over a period of one year. Ethical committee approval was procured before onset of the study, and well informed and written consent was obtained from all participants.

A total of 60 patients classified as American Society of Anesthesiologists (ASA) physical status I or II, scheduled for elective lumbar unilateral laminectomy with bilateral decompression, were registered and assigned randomly into two equal groups (n = 30 each): Group SA (spinal anaesthesia) and Group GA (general anaesthesia).

Preoperative Assessment

A thorough pre-anaesthetic evaluation including detailed history, clinical examination, and routine laboratory investigations was done. Thereafter standard preoperative instructions and medications were given.

Spinal Anaesthesia Technique

Patients were coloaded with 12–15 ml/kg of intravenous crystalloid solution. Under strict aseptic precautions, with the patient in sitting position, spinal anaesthesia was administered at the L2–L3 intervertebral disc space using a 25-gauge Quincke spinal needle via loss of resistance technique. Following confirmation of free flow of cerebrospinal fluid, 0.5% hyperbaric bupivacaine (15 mg) combined with fentanyl 25 µg was administered intrathecally. Patients were subsequently positioned supine and later prone for surgery. Sensory blockade to the T10 level was confirmed prior to surgical incision. Haemodynamic parameters were continuously monitored throughout the procedure. Intraoperative hypotension was managed with intravenous fluids and vasopressors as required.

General Anaesthesia Technique

After preoxygenation with 100% oxygen for 3–5 minutes, anaesthesia was induced with Inj. Propofol (2 mg/kg) and Inj. Fentanyl (2 µg/kg). Neuromuscular blockade was achieved with vecuronium (0.1 mg/kg), followed by endotracheal tube placement. Anaesthesia was sustained with a combination of oxygen (50%), nitrous oxide (50%), and sevoflurane (1.2%). Ventilation was regulated to keep the patient normocapnic. Standard intraoperative monitoring included electrocardiography (ECG), non-invasive blood pressure measurement, pulse oximetry, and capnography. At the end of surgery, neuromuscular blockade was reversed with neostigmine and glycopyrrolate, and patients were extubated following adequate recovery.

Parameters Assessed

Intraoperative blood loss

Haemodynami parameters (heart rate, blood pressure Duration of surgery Duration of postoperative analgesia Perioperative complications (PONV, hypotension, bradycardia)

Statistical Analysis

For continuous variables data is expressed as mean ± standard deviation (SD) and for categorical variables as frequency (percentage). Intergroup comparisons were performedusing the independent samples t-test for continuous data and the chi-square test for categorical data. A P value of < 0.05 was considered statistically significant.

RESULTS

The two groups were comparable with respect to age (56 ± 16.1 years in the SA group vs. 58 ± 14.3 years in the GA group; P = NS). There was, however, a statistically significant difference in body mass index (BMI) between the groups (28.3 ± 5.2 kg/m² in the SA group vs. 31.5 ± 3.0 kg/m² in the GA group; P < 0.001). Demographic and baseline characteristics are presented in Table 1.

Intraoperative blood loss was significantly lower in the SA group (100

± 35 ml) compared with the GA group (240 ± 40 ml; P < 0.05). The duration of surgery was comparable between groups (115 ± 3.2 min vs. 120 ± 7.7 min; P = NS; Table 2).

The duration of postoperative analgesia was remarkably longer in the SA group (240 ± 45 min) in comparison with the GA group (140 ± 10 min; P < 0.001; Table 3).

Regarding complications, PONV occurred in 1 patient (3.3%) in the SA group and 4 patients (13.3%) in the GA group. One patient in the SA group developed intraoperative hypotension, which was managed successfully with intravenous fluids and vasopressors. No episodes of bradycardia were recorded in either group (Table 4).

Table 1: Demographic and Baseline Characteristics

Parameter	SA Group (n = 30)	GA Group (n = 30)	P value
Age (years), mean ± SD	56 ± 16.1	58 ± 14.3	NS
BMI (kg/m²), mean ± SD	28.3 ± 5.2	31.5 ± 3.0	< 0.001
ASA I, n (%)	12 (40%)	18 (60%)	—
ASA II, n (%)	18 (60%)	12 (40%)	—

ASA = American Society of Anesthesiologists; BMI = body mass index; GA = general anaesthesia; NS = not significant; SA = spinal anaesthesia; SD = standard deviation.

Table 2: Intraoperative Parameters

Parameter	SA Group	GA Group	P value
Duration of surgery (min), mean ± SD	115 ± 3.2	120 ± 7.7	NS
Intraoperative blood loss (ml), mean ± SD	100 ± 35	240 ± 40	< 0.05

GA = general anaesthesia; NS = not significant; SA = spinal anaesthesia; SD = standard deviation.

Table 3: Duration of Postoperative Analgesia

Parameter	SA Group	GA Group	P value
Duration of postoperative analgesia (min), mean ± SD	240 ± 45	140 ± 10	< 0.001

GA = general anaesthesia; SA = spinal anaesthesia; SD = standard deviation.

Table 4: Perioperative Complications

Complication	SA Group, n (%)	GA Group, n (%)
PONV	1 (3.3%)	4 (13.3%)
Hypotension	1 (3.3%)	0 (0%)
Bradycardia	0 (0%)	0 (0%)

GA = general anaesthesia; PONV = postoperative nausea and vomiting; SA = spinal anaesthesia.

DISCUSSION

This prospective comparative study demonstrated several clinically important advantages of spinal anaesthesia over general anaesthesia for lumbar unilateral laminectomy with bilateral decompression. The findings are consistent with existing literature supporting the use of spinal anaesthesia as a safe and effective alternative for lumbar spine surgery.

The remarkable reduction in blood loss during the surgery observed in the SA group (100 ± 35 ml vs. 240 ± 40 ml; P < 0.05) is likely attributable to sympathetic blockade, which results in reduced venous pressure and a degree of controlled hypotension within the operative field. This finding aligns with prior studies reporting reduced blood loss with neuraxial anaesthesia.[2–4]

The significantly prolonged duration of postoperative analgesia in the SA group (240 ± 45 min vs. 140 ± 10 min; P < 0.001) is primarily attributable to the use of intrathecal fentanyl, which provides opioid-mediated spinal analgesia beyond the duration of motor and sensory blockade. This advantage translates to reduced early postoperative analgesic requirements and improved patient comfort.

Better haemodynamic stability in the SA group reflects a blunted surgical stress response associated with neuraxial blockade. The higher prevlance of PONV in the GA group (13.3% vs. 3.3%) is consistent with the known emetogenic effects of inhalational anaesthetic agents such as sevoflurane.[1]

The restraints of this study are its comparatively small sample size, and the monocentric design, which may limit generalisability. Future well-powered, randomised controlled trials are required to substantiate these findings.

CONCLUSION

Spinal anaesthesia is a safer and effective alternative to general anaesthesia for lumbar unilateral laminectomy with bilateral decompression. It offers superior haemodynamic stability, significantly reduced intraoperative blood loss, prolonged postoperative analgesia, and a lower incidence of PONV. These findings support the broader adoption of spinal anaesthesia for appropriately selected patients undergoing lumbar decompression surgery.

Declarations

Patient consent: Written informed consent was obtained from all participants prior to enrolment.

Financial support and sponsorship: Nil.
Conflicts of interest: There are no conflicts of interest.

Data availability: The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Use of artificial intelligence: No artificial intelligence tools were used in the preparation of this manuscript.

REFERENCES

1. Jellish WS, Thalji Z, Stevenson K, Shea J. A prospective randomized study comparing short- and intermediate-term perioperative outcome variables after spinal or general anesthesia for lumbar disc and laminectomy surgery. Anesth Analg 1996;83:559-64.
2. McLain RF, Kalfas I, Bell GR, Tetzlaff JE, Yoon HJ, Rana M. Comparison of spinal and general anesthesia in lumbar laminectomy surgery: a case-controlled analysis of 400 patients. J Bone Joint Surg Am 2004;86:271-6.
3. Attari MA, Mirhosseini SA, Honarmand A, Safavi MR. Spinal anaesthesia versus general anaesthesia for elective lumbar spine surgery: a randomised clinical trial. J Res Med Sci 2011;16:524-9.
4. Meng T, Zhong Z, Meng L. Impact of spinal anaesthesia vs. general anaesthesia on perioperative outcome in lumbar spine surgery: a systematic review and meta-analysis of randomised controlled trials. Anaesth Crit Care Pain Med 2017;36:219-28.
5. Rodgers A, Walker N, Schug S, McKee A, Kehlet H, van Zundert A, et al. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomised trials. BMJ. 2000;321(7275):1493. Doi: 10.1136/bmj.321.7275.1493.
6. Ditzler JW, Dumke PR, Harrington JJ, Fox JD. Should spinal anesthesia be used in surgery for herniated intervertebral disk. Anesth Analg. 1959;38(2):118–24.
7. Sadrolsadat SH, Mahdavi AR, Moharari RS, Khajavi MR, Khashayar P, Najafi A, et al. A prospective randomized trial comparing the technique of spinal and general anesthesia for lumbar disk surgery: a study of 100 cases. Surg Neurol. 2009;71(1):60–5. Doi: 10.1016/j.surneu.2008.08.003.
8. Tetzlaff JE, Dilger JA, Kodsy M, al Bataineh J, Yoon HJ, Bell GR. Spinal anesthesia for elective lumbar spine surgery. J Clin Anesth. 1998;10(8):666–9. doi: 10.1016/s0952-8180(98)00112-3.