

Is neuraxial techniques possible for lumbar spine surgery and is there any advantages over general anesthesia?

Most patients undergoing lumbar spine surgery receive a general anesthetic (GA). With advances in surgical technique, neuraxial techniques including spinal anesthesia have been used for less extensive lumbar laminectomy and discectomy procedures¹. The potential benefits of a neuraxial technique includes avoidance of airway instrumentation, potentially better intraoperative hemodynamics, less blood loss, and less postoperative nausea and vomiting (PONV)¹. However, there are challenges associated with an awake patient in the prone position including an unsecured airway and the potential for patient movement and anxiety to interfere with surgery.

Several randomized control trials (RCT) and subsequent meta-analyses have been performed comparing spinal anesthesia (SA) and GA. Meng et al looked at 625 patients in 8 RCTs and found that the SA group had significantly less intraoperative hypertension and tachycardia, shorter length of stay, less analgesic requirements in the post anesthetic care unit (PACU) and less PONV². The type of surgeries included in the studies were single or double level discectomy, microdiscectomy or laminectomy with surgery duration typically less than 2 hours. The spinal anesthetic commonly consisted of bupivacaine with doses between 10-20 mg with or without intrathecal fentanyl and sedation. A more recent meta-analysis of 11 RCTs by De Cassai et al supported these findings in addition to higher patient satisfaction in the SA group and no difference in intraoperatively hemodynamics or rates of urinary retention between the two groups³. A small non-randomized prospective study showed the patients who received SA had less postoperative fatigue and better quality of life but there was no difference in postoperative cognitive dysfunction between the two groups. The study has many limitations, but the results are interesting nonetheless⁴.

A limitation of single shot SA is the inability to extend the duration of the anesthetic. Epidural anesthesia (EA) for lumbar spine surgery has been investigated as an alternative given its ability to provide prolonged block with repeated dosing. However, there is concern regarding the density of surgical block and the potential for epidural catheters to interfere with the surgical field. Compared to SA, there is less evidence in literature supporting its use, with most of the studies looking at EA as an adjunct to GA. Demirel et al completed a prospective randomized study comparing EA vs GA for elective lumbar laminectomy and discectomy procedures. The epidural was placed two intervertebral levels above the site of surgery and the epidural catheter was tunnelled cranially. The epidural was used both for intraoperative surgical anesthesia as well as postoperative analgesia. The main findings from the study were the EA group required less total opioids perioperatively, had lower pain scores in the PACU and 24 hours postoperatively, less PONV and patients were more satisfied. There was no difference in urinary retention or total procedure time. The GA group had more hypertension both intraoperatively and in the PACU. Of note, the epidural catheter was not in the surgical field for all patients in the EA group and thus did not interfere with surgery⁵. A small prospective study comparing EA and GA in single level microdiscectomy surgeries also showed less PONV in the EA group but no difference in mean surgical time, anesthetic time or hospital stay. No patients required conversion from EA to GA⁶. With regards to EA as an adjunct, Ezhevskaya et al conducted a prospective randomized study of 85 patients undergoing thoracolumbar spinal fusion of 2 or more levels. Patients received either combined GA/EA with postoperative epidural analgesia or GA alone with opioid analgesia. The GA/EA group is associated with less opioid medication use, less PONV, less intraoperative blood loss, earlier mobility, and lower levels of proinflammatory cytokines and cortisol⁷.

Neuraxial anesthesia may be a viable option for simple lumbar spinal procedures. Spinal anesthesia for single level discectomy and laminectomy is associated with less PONV, better analgesia in the PACU and improved patient satisfaction. Epidural anesthesia, on the other hand, was not as robustly studied and more prospective randomized trials are required to determine its impact on patient outcomes compared to GA. However, it would appear that a continuous epidural is a useful analgesic adjunct to GA and the concerns surrounding interference with the surgical field may be less impactful than previously thought.

References

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