Case Report

Spinal for spine: Lumbar decompression and discectomy under subarachnoid block: A case series

B M Munasinghe, Nishanthan Subramaniam, S Hameed, J K D B S Ranatunga

District General Hospital, Mannar, Sri Lanka

Corresponding Author: B M Munasinghe < malakafmp@gmail.com > https://orcid.org/0000-0001-8373-4752

Introduction

Spinal decompression procedures require a mode of anaesthesia which should facilitate prone positioning, muscle relaxation for ease of retraction and effective, lengthy analgesia. In such cases, spinal anaesthesia is associated with numerous advantages over general anaesthesia. But precise case selection is of utmost importance. The cases presented here are single-level, unilateral lumbar decompressions in healthy young adults, performed by the same anaesthetic and orthopaedic teams led by a Consultant Anaesthetist and a Consultant Orthopaedic Surgeon. The success of these cases, both anaesthetically and surgically, suggest further studies which may reinforce these positive outcomes and may result in integration of such practices locally.

Following the first description by Mixter and Barr in 1934, various surgical techniques have been introduced for lumbar discectomy [1]. However, anaesthetists have relied heavily on general anaesthesia (GA) until recently where central neuraxial blocks (CNB) have been successfully utilized, mostly for uncomplicated lumbar or lower thoracic decompressions and discectomies, with recognized advantages over its predecessor. We report two successful lumbar decompression and discectomies performed under subarachnoid block (SAB). To the best of our knowledge, similar documented cases in Sri Lanka are unavailable.

Case Discussion

Two previously healthy, young adult males who had neurological symptoms and nerve root compression on MRI (Figure 1 and 2) were planned for unilateral L4-5 decompression and discectomy under SAB by the same Consultant Orthopaedic Surgeon.
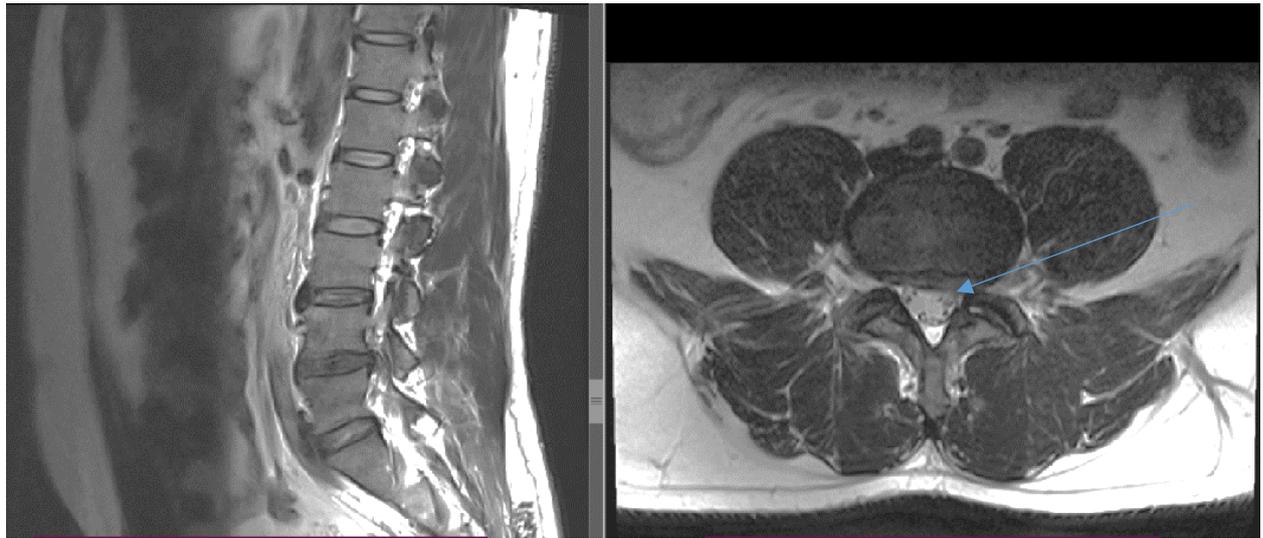
Figure 1: T2 weighted MRI image of Patient 1.
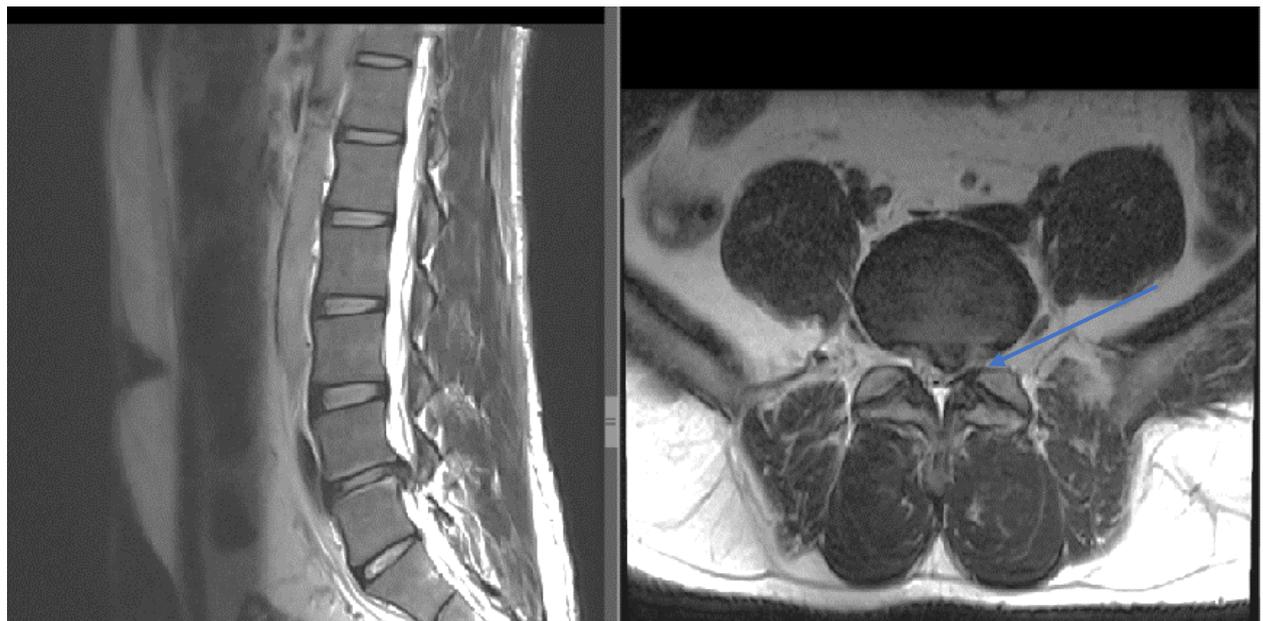Left L 4/5 lateral recess stenosis shown with blue arrow, no spinal canal stenosis

Figure 2: T2 weighted MRI image of Patient 2.
Left L 4/5 lateral recess stenosis shown with blue arrow, no spinal canal stenosis

At the preoperative anaesthetic visit, a detailed description was provided regarding the anaesthesia and prone positioning. On the day of surgery, standard monitoring was established. Intravenous 7ml/kg crystalloid bolus was infused. SAB was performed at L3-4 level with 3ml 0.5% heavy bupivacaine and 15µg fentanyl. A fixed sensory level of T5 was achieved within 20 minutes. Following turning prone, patients were positioned comfortably. Patient 1 had stable haemodynamics throughout.

In patient 2, an identical SAB was performed. However, after change of position (to prone), a drastic haemodynamic collapse was witnessed. A sensory level of T4 was elicited. The patient was conscious and maintained his airway with no respiratory paralysis. The episode was swiftly and effectively managed with intravenous atropine 1.2mg, ephedrine 10mg and a crystalloid bolus. Surgery commenced following sustained haemodynamic stability. Both patients received intravenous propofol 5ml/hr as an infusion for sedation which was monitored continuously by the Ramsay sedation scale. Respiratory parameters were closely monitored including respiratory rate and peripheral oxygen saturation. Both parameters were maintained in the range of 10-16 per minute and 97-100% respectively, not requiring ventilatory support or supplemental oxygen throughout the procedures.

Surgical procedure involved a posterior lower midline incision extending from L2 to S1 level, paraspinal muscle retraction, exposure of left L4/5 inter laminar space, L4 laminotomy, flavectomy and medial facetectomy. As epidural bleeding complicated the surgery in patient 2 who had a higher mean arterial pressure (in the absence of pain and sedation score of 3), 15 mg of intravenous Hydralazine was administered as a bolus. Each patient received intravenous paracetamol and subcutaneous morphine with surgical wound infiltration with bupivacaine at the end. Highest pain score of 5 were noted at immediate postoperative period, 7 hours and 12 hours post-operatively in patient 1 and 2 respectively, which was managed with multimodal analgesia which included oral gabapentin continued from the preoperative period. Patient 2 developed a painless urinary retention which was transient. Both were mobilized the next day and discharged.

Table 1: Demographic, intraoperative and postoperative details

Variable	Patient 1	Patient 2
Age	39	32
Sex	Male	Male
Height	175cm	178cm
Weight	82kg	70kg
ASA grading	ASA I	ASA I
Mode of anaesthesia	Subarachnoid block	Subarachnoid block
Level of entry	L3 / L4	L3 / L4
Dose	0.5% Heavy bupivacaine 3 ml	0.5% Heavy bupivacaine 3 ml
Intrathecal adjuncts	Fentanyl 15 mcg	Fentanyl 15 mcg
Intravenous adjuncts	Propofol 5ml/hr	Propofol 5ml/hr
Sensory level at 20 minutes (Cold touch)	T5	T5
Sedation score (Ramsay sedation scale)	3	3
Duration of surgery	120 minutes	165 minutes

Duration of sensory block (up to operative site)	140 minutes	195 minutes
Blood loss	270ml	450ml
Muscle relaxation	Initially inadequate With positional change- satisfactory	satisfactory
Pain score (Numerical rating scale) PACU	5	5
6 hours postop	4	3
12 hours postop	3	5
Analgesic therapy	Paracetamol 1g q6hrly P.O. S/C Morphine 6mg q6hrly O. Gabapentin 300mg tds	Paracetamol 1g q6hrly P.O. S/C Morphine 6mg q6hrly O. Gabapentin 300mg tds
Other adverse effects		
Nausea, vomiting	No	No
Urinary retention	No	Yes
Persistent/ new neurological deficit	No	No
PDPH	No	No

PACU, Post-anaesthesia care unit; PDPH, Postdural puncture headache; S/C, subcutaneous; P.O,Per oral
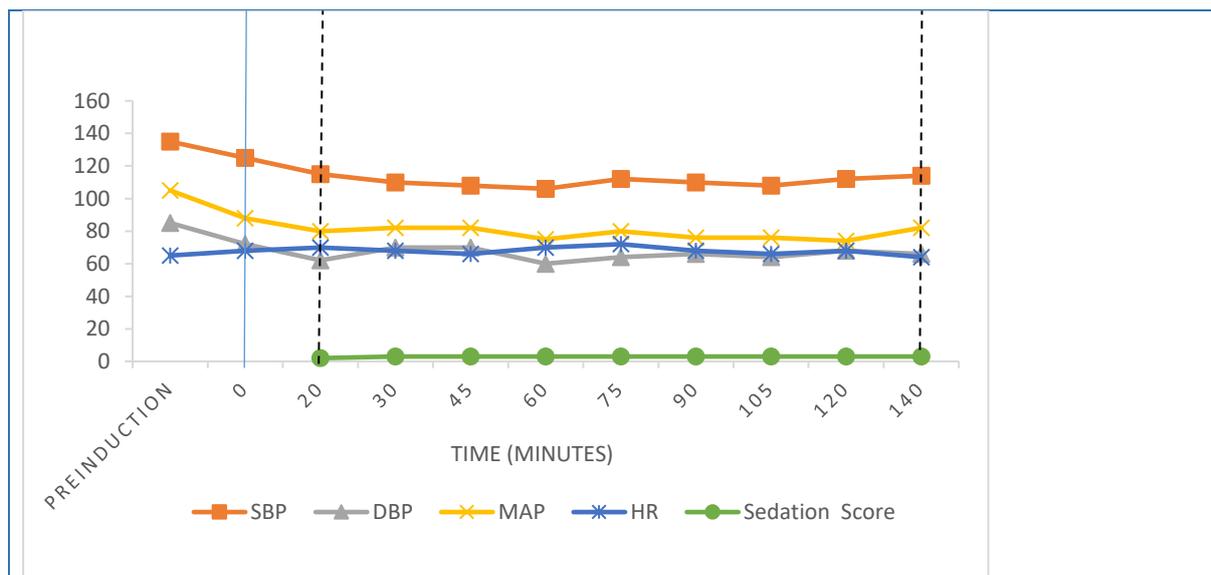

Figure 3: Vital parameters of Patient 1.
Blue vertical line, CNB administered; Dotted lines, Commencement and completion of the surgery
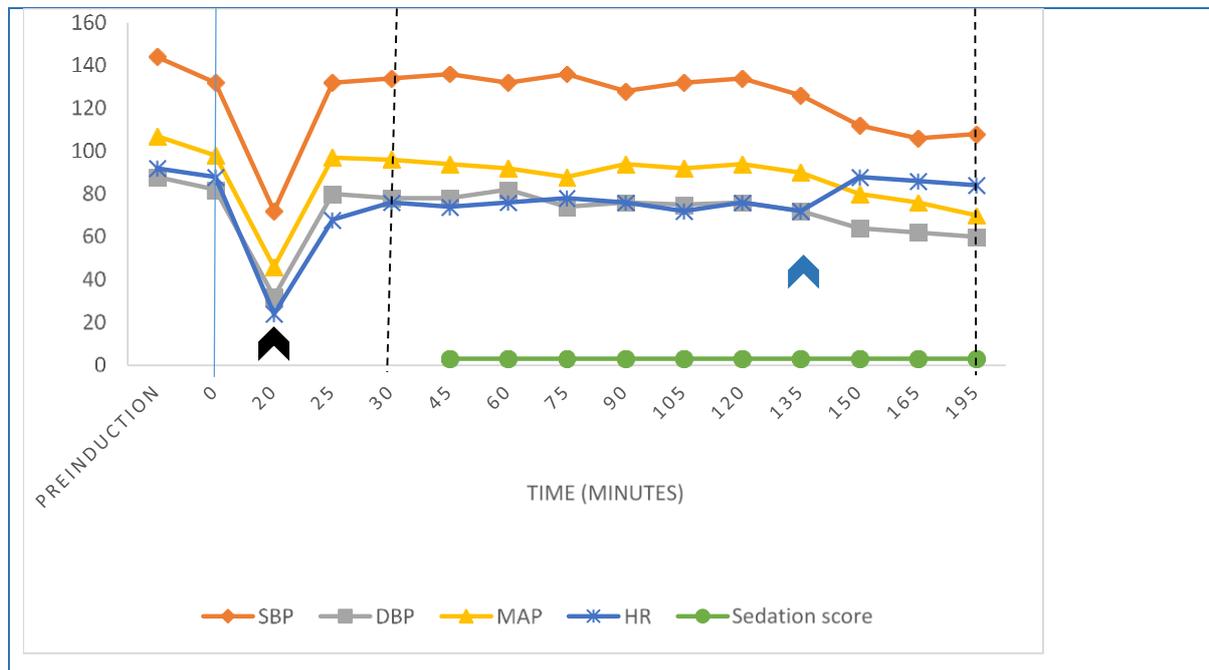
Figure 4: Vital parameters of Patient 2.
Blue vertical line, CNB administered; Dotted vertical lines, Commencement and completion of surgery; Black arrow, Haemodynamic collapse with a T4 sensory level; Blue arrow, intravenous Hydralazine bolus to control epidural bleeding.

Discussion

Discectomy is the commonest spinal surgery performed for lumbar disc herniation [1] for which GA with endotracheal intubation is still preferred by the majority of the anaesthetists [2]. Familiarity, greater patient acceptance, reliable airway security and prolonged analgesia are commonly cited reasons [2-4]. The need for lateral decubitus or prone positioning, which may not be tolerated by patients for long periods, frequently precludes central neuraxial blocks (CNB) during complicated or re-do surgeries [4]. Other concerns with CNB are the potential risk of worsening of existing neurological deficits, durotomy and spinal infection. MacLain et al., conducted a retrospective, case-controlled study involving 400 patients who underwent lumbar spinal surgeries and found no conclusive evidence for this. The sensory levels achieved during these studies ranged from T10 to T6 without major haemodynamic instability following positional change [2,4,5]. Continuous and close monitoring is advisable, particularly after turning prone, as migration of local anaesthetic above T4 level could lead to cardiac instability and respiratory failure with intercostal muscle paralysis. Optimizing volume status prior to surgery is important in this aspect. Urinary retention is witnessed following both forms of anaesthesia without any predilection [5]. It is most likely due to opiates in the CNB group [6].

The advantages of CNB for spinal surgeries have long been recognized and include reduced intraoperative bleeding, post-operative nausea and vomiting, thromboembolic

episodes and opiate requirements due to superior analgesia [3,5,7]. Hypertensive episodes are more common among the GA group, which may increase bleeding, obscuring the operative field and requiring longer surgical times. Potentially debilitating complications of nerve injuries and post-operative visual loss due to prone positioning are also drastically reduced with CNB [4]. Tolerance of prone positioning in an awake patient could also effectively be extended using carefully titrated sedatives such as intravenous propofol, remifentanil, dexmeditomidine or ketamine while addition of adjuvants (opiates, alpha-2 agonists) to SAB local anaesthetic have also been studied [8-9]. The latter were associated with differing but lengthier sensory blocks. In cases where CNB wears off, a long acting local anaesthetic could be injected intra-durally as a second SAB by the surgeon. Converting to GA is a difficult rescue method but quite uncommon following CNB. Moreover, the incidence of PDPH associated with SAB was found to be very low in spinal surgeries [3,4]. SAB, epidural and combined spinal-epidural are documented modalities of CNB utilized with decreasing popularity.

While the advantages of CNB are evident, case selection is very important. Severe or multi-level canal stenosis requires bilateral dissections and could lead to prolonged operative times with the possibility of unpredictable spread of local anaesthetic. The risk of inadequate or failed sensory block in patients with spinal canal stenosis was studied by Hebl et al and he observed a success rate of 97% following CNBs [10]. In a recent meta-analysis, delayed neurological assessment and delayed detection of a surgical haematoma have been pointed out as possible drawbacks in the SAB group [11]. Overall, single or two-level decompressions, probably, are more fitting for CNB as surgical times are shorter (less than 2 hours) and better tolerated by patients. Multiple level laminectomies could lead to extensive bleeding and extended surgical times [3]. CNB is not advisable for obese patients as respiration could be hindered in the prone position [3]. Patients with diminished physiological reserves (elderly, multiple comorbidities) and those who might not cooperate with prolonged prone positioning are similarly not suitable candidates. However, a retrospective study conducted on 18 patients who belonged to advanced American Society of Anesthesiologists grading (3 and 4) who underwent lumbar spine surgeries yielded good outcomes [12]. Nonetheless, it is wise to choose a low-risk patient cohort when initially venturing into spinal surgeries under SAB.

Conclusion

Carefully selected patients for uncomplicated spinal surgeries benefit from CNB in view of reduced blood loss, opiate consumption, superior analgesia and improved overall comfort perioperatively. Rescue methods in cases of failed or receding sensory blocks in unanticipated prolonged surgeries should be carefully laid out preoperatively combined with appropriate sedation protocols, ultimately presenting a safer and more pleasant surgical experience to the patients.

Acknowledgments

Consent
Informed, written consent was taken from the patients with regard to use of patient details and imaging for publication.

Confidentiality
Every effort was taken to keep the identity of the patients non-disclosed

References

1. Blamoutier A. Surgical discectomy for lumbar disc herniation: Surgical techniques. Orthopaedics & Traumatology: Surgery & Research. 2013;99(1, Supplement):S187-S96. https://doi.org/10.1016/j.otsr.2012.11.005

2. Munoli S. A study of lumbar spine surgeries under spinal anaesthesia. International Journal of Orthopaedics. 2020;6(1):259-61. https://doi.org/10.22271/ortho.2020.v6.i1e.1876

3. Jellish WS, Shea JF. Spinal anaesthesia for spinal surgery. Best Practice & Research Clinical Anaesthesiology. 2003;17(3):323-34. https://doi.org/10.1016/S1521-6896(02)00115-5

4. McLain RF, Kalfas I, Bell GR, et al. Comparison of spinal and general anesthesia in lumbar laminectomy surgery: a case-controlled analysis of 400 patients. Journal of Neurosurgery: Spine. 2005;2(1):17. https://doi.org/10.3171/spi.2005.2.1.0017

5. 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 Disk and Laminectomy Surgery. Anesthesia & Analgesia. 1996;83(3):559-64. https://doi.org/10.1213/00000539-199609000-00021

6. Mahan KT, Wang J. Spinal morphine anesthesia and urinary retention. Journal of the American Podiatric Medical Association. 1993;83(11):607-14. https://doi.org/10.7547/87507315-83-11-607

7. Benyahia NM, Verster A, Saldien V, et al. Regional anaesthesia and postoperative analgesia techniques for spine surgery - a review. Rom J Anaesth Intensive Care. 2015;22(1):25-33.

8. Kang SY, Kashlan ON, Singh R, et al. Advantages of the Combination of Conscious Sedation Epidural Anesthesia Under Fluoroscopy Guidance in Lumbar Spine Surgery. J Pain Res. 2020;13:211-9. https://doi.org/10.2147/JPR.S227212

9. Reddy RM, Prasad ND, Shankar RS. Spinal anaesthesia for single level spine surgery: comparison between bupivacaine with fentanyl and bupivacaine with clonidine. Sri Lankan Journal of Anaesthesiology. 2019;27(1). https://doi.org/10.4038/slja.v27i1.8391

10. Hebl JR, Horlocker TT, Kopp SL, Schroeder DR. Neuraxial Blockade in Patients with Preexisting Spinal Stenosis, Lumbar Disk Disease, or Prior Spine Surgery: Efficacy and Neurologic Complications. Anesthesia & Analgesia. 2010;111(6):1511-9. https://doi.org/10.1213/ANE.0b013e3181f71234

11. Meng, T., Zhong, Z. and Meng, L. (2017), Impact of spinal anaesthesia vs. general anaesthesia on peri-operative outcome in lumbar spine surgery: a systematic review and meta-analysis of randomised, controlled trials. Anaesthesia, 72: 391-401. https://doi.org/10.1111/anae.13702

12. Patil H, Garg N, Navakar D, Banabokade L. Lumbar Spine Surgeries Under Spinal Anesthesia in High-Risk Patients: A Retrospective Analysis. World neurosurgery. 2019 Apr 1;124:e779-82. https://doi.org/10.1016/j.wneu.2019.01.023