Original Article Journal of Clinical Orthopaedics 2022 Jul-Dec;7(2):38-42

Moving toward Regional Anaesthesia for Spine Surgery - Need of the Hour

Samidha Waradkar[1], Aaliya Mehmood[2], Saijyot Raut[3], Vishal Kundnani[4]

Abstract

Background: In the last few decades, many studies have been conducted on comparison between general anaesthesia (GA) versus spinal anaesthesia (SA) for lumbar spine surgeries and each have reported discrepancies between the two methods of induction with equivalent pros and cons; ultimately failing to state a final conclusive method. With the ongoing COVID pandemic, and the fear of aerosol generation associated with GA; our focus has shifted on regional anesthesia completely, as it is been proven safer and more hassle-free to conduct during these challenging times.

Materials and Methods: A similar case study was conducted with 178 patients posted for lumbar spine procedures under the same surgeon. Wherein, 86 received GA and 92 SA. Appropriate statistical analysis was applied to identify differences in blood loss, operative time, time from entering the operating room (OR) until incision, time from bandage placement to exiting the OR, total anesthesia time, PACU time, and total hospital stay. Secondary outcomes of interest included incidence of postoperative spinal hematoma and death, incidence of paraparesis, paraplegia, paraesthesia, post-Dural puncture headache, signs of meningism, urinary retention, and other perioperative complications among the SA patients.

Results: SA was associated with significantly lower operative time, blood loss, total anaesthesia time, time from entering the OR until incision, time from bandage placement until exiting the OR. SA was also associated with shorter stay in the PACU, and overall lesser total duration of hospital stay. None of the 92 patients in SA group needed conversion to GA or had an episode of high/complete sympathetic blockade. No incidences of paraparesis or paraplegia, or episodes of persistent post-operative paraesthesia or weakness, Bagai (vasovagal) syncope, PONV, post-op meningism, post-dural puncture headache, spinal hematoma, intraoperative dural Cerebrospinal Fluid leak or post-op fistula, were noted. There were two incidences of failed spinal which were easily managed with a lower dose repeat SA. Overall better post-op analgesia and higher patient and surgeon satisfaction compared to GA was observed.

Conclusion: SA is effective for use in patients undergoing elective lumbar spine surgeries and very efficient alternative technique to GA. SA offers efficient OR functioning with decreasing overall operation theatre time and shown to be the more convenient anesthetic choice in the perioperative setting.

Keywords: Spinal Anaesthesia, Regional Anaesthesia, Covid-19, Spine Surgery, Lumbar Discectomy, Fast Track Anaesthesia, Aerosol Generation

Introduction

The year 2020-2021 saw a global upsurge of covid-19 cases. India being the epicenter of the pandemic faced this crisis head-on.

In the words of John F Kennedy: when written in Chinese the word Crisis (危机) is composed of two characters, 危 represents - danger and the other 机 represents - Opportunity. We had a similar opportunity provided to us by Dr Vishal Kundnani (Spine Specialist). In the last one 1 year, around 92 micro-lumbar spine surgeries were performed under spinal anaesthesia (SA), with lumbar discectomy/ decompression being the most performed procedures.

SA for spine surgery has been established as an accepted technique for many years. With the refinement in the surgical

[1]Consultant Anesthesiology, at Lilavati Hospital and Research Centre, Mumbai, India,
[2]Senior Resident Anesthesiology at Lilavati Hospital and Research Centre, Mumbai, India,
[3]MS Ortho, Consultant Spine Surgeon at Spine Centre, Andheri and SL Raheja Hospital, Mahim, Mumbai, India,
[4]MS Ortho, Consultant Spine Surgeon at Lilavati Hospital and Research Centre, Mumbai, India.

Address of Correspondence
Dr. Aaliya Mehmood,
Flat 701, A-8, Al-Quba CHS, Millat Nagar, Andheri West, Mumbai 400053, India.
E-mail: aaliyamehmood@hotmail.com

Submitted Date: 14 Jul 2022, Review Date: 24 Aug 2022, Accepted Date: 30 Sep 2022 & Published Date: 10 Dec 2022

Surgical procedures on the lumbar spine for which Spinal Anaesthesia can be administered include

- Discectomy
- Foraminotomy
- Synovial cyst removal
- Decompression
- several types of fusions (single/double level)
- lower thoracic/lumbosacral biopsy

technique, lumbar discectomy and decompression have become minimally invasive. They have a mean surgical duration of approximately 1 hour; with single level fusion requiring 2 h [as shown in Fig. 3and 4] and double level fusions requiring maximum of 3 hours. This has made SA an attractive choice for these patients especially in the Covid scenario.

In today's era of minimally invasive to non-invasive fast track surgeries it has become the need of the hour to provide fast track and well-balanced anaesthesia techniques to accelerate recovery and facilitate faster postoperative discharges. Furthermore, with the ongoing COVID - 19 pandemic, providing regional anaesthesia wherever feasible has led to decreased airway handling and the subsequent aerosol generation related complications.

Materials and Methods

Out of 178 patients, 92 patients of American Society of Anaesthesiologist Physical Status (ASA-PS) I-II aged 18-–93 years old scheduled for discectomy, laminectomy, or decompression were selected for SA. Patients with history of seizure, intracranial hypertension, allergic to local anaesthetics, CNS disorders, other contraindications for SA spinal anaesthesia such as patient's refusal, coagulopathy, infection at site of needling, hypovolemia, severe spinal stenosis, a near complete or total myelography block, myelography demonstration of arachnoiditis, drug, or alcohol abuse were excluded from the study. Patients having any changes in surgical technique or anticipated massive bleeding during operation which needed

Figure 1: Intraop Ongoing L2 vertebroplasty with L3-L4 percutaneous screw fixation with patient lying in prone position under Spinal Anaesthesia.

blood transfusion, were also excluded from the study. Eligible candidates were given written informed consent.

Patients were premedicated with Cap Pan D 2 hours h beforeprior to surgery in the wards. Once in OR, after attachment of ASA monitors and establishment of a venous access, the patients were placed into a sitting position and under all aseptic precautions, SA was performed using a 25-gauge Whitacre spinal needle

Patient preferred for spinal anaesthesia

- ASA I-II
- Age 18 years and above
- Compliant and cooperative
- Hemodynamically stable
- Short duration of surgical procedure
- Estimated lesser fluid shifts and blood loss

Patients excluded for spinal anaesthesia (GA Preferred) [*]

- Patient refusal
- Patients with history of seizure, intracranial hypertension
- allergic to local anaesthetics
- CNS disorders
- Coagulopathy
- infection at site of needling
- hypovolemic or hemodynamically unstable
- severe spinal stenosis
- a near complete or total myelography block
- myelography demonstration of arachnoiditis
- drug or alcohol abuse
- morbidly obese
- not optimised multiple comorbidities
- Patients having any changes in surgical technique
- anticipated massive bleeding during operation which needed blood transfusion
- procedure expected to extend longer than the neuraxial block
- fixed cardiac output states (ischemic heart disease patients with low EF, severe AS/MS)
- indeterminate neurological diseases like GBS, multiple sclerosis (relative contraindication)

Figure 2: A 87-year-old female patient posted for L2 vertebroplasty with L3-L4 percutaneous screw fixation lying prone comfortably under spinal anesthesia.

at 1-–2 interspace above or below the surgical level, after local infiltration of 2-–3 ml of 2% Lidocaine. The Subarachnoid block was done with 3.0 –-3.6 ml 0.5% (heavy/hyperbaric) Bupivacaine in an 8.5% Dextrose solution combined with 25 µg Fentanyl after preloading/co-loading patients with balanced salt (isotonic) solution over 10-–15 minutes. After vigilant administration of drug into the intrathecal space, the patients were placed in supine position. Five to ten minutes after establishment of spinal level of block (which usually occurred between T-6 and T-10), the patients were gradually placed into prone position (as shown in Fig. 1 and 2].

The heart rate, systolic, diastolic, mean arterial blood pressure, and oxygen saturation were monitored every 5-–10 minutes min using ECG, non-invasive blood pressure monitoring, and pulse

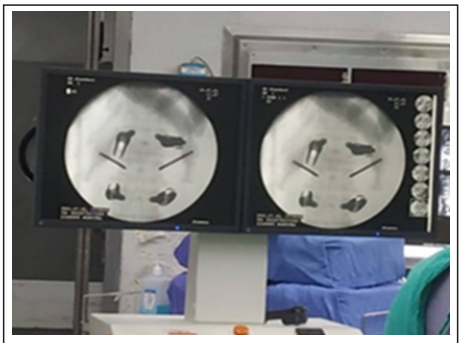


Figure 3: AP views post L2 vertebroplasty with L3-L4 percutaneous screw fixation.

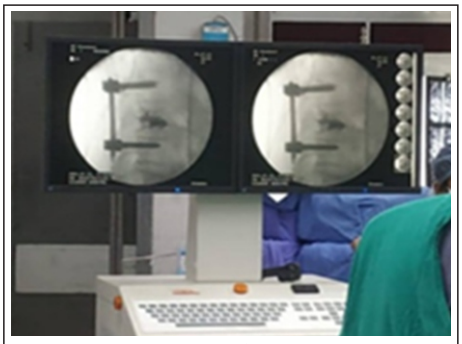


Figure 4: Lateral views post L2 vertebroplasty with L3-L4 percutaneous screw fixation.

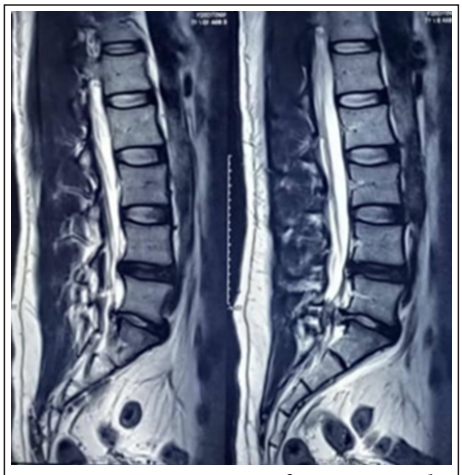


Figure 5: MRI LS spine of a 37-year male, with large sequestration of PVID at L5-S1. Planned for Tubular Micro-endoscopic Discectomy under spinal anesthesia.

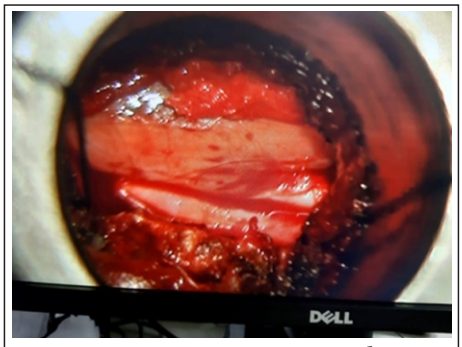


Figure 6: Intraoperative Micro-endoscopic picture through the tubular portal for discectomy showing the nerve roots well decompressed.

oximetry. Oxygen at 2-–6L/min via through nasal cannula was administered throughout intraoperative journey.

Intraoperatively, if the patients had bradycardia (heart rate less than <40 per /minutes) or hypotension (systolic blood pressure less than <80 mmHg OR MAP < 50 mm Hg), 0.6 mg Atropine/0.2 mg Glycopyrrolate or 5 mg Ephedrine was administered. If needed patients were sedated with 1-–2 mg Midazolam or IV Dexmedetomidine 0.2-–0.7 ug/kg/hr infusion. At the end of surgery, the infusion was discontinued, the patients were turned from the prone to supine position and transferred to the PACU/Recovery room. When patients had no pain, nausea, vomiting, and at least regression of spinal block below T10, they were discharged from the PACU.

Results

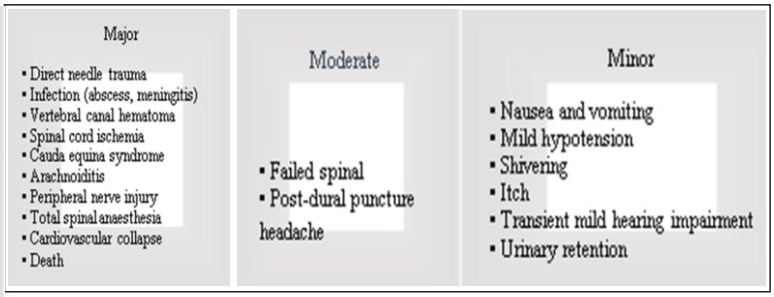
Each patient's age, sex, height, weight, and ASA ASA-PSphysical status were recorded. Throughout the administration of anaesthetics, maximum heart rate and mean arterial blood pressure changes compared to the baseline were recorded. Blood loss was monitored and recorded. Duration of surgery (the time from beginning surgery to the closure of wound by the last suture) and duration of recovery stay (the time from arrival to the PACU to discharge from it) were recorded. Post-operative analgesic use till 24 hours h post-surgery and the incidence of nausea and vomiting was recorded.

Table 1: Comparison of GA Vs RA with various Surgical Factors

Parameter	General Anesthesia (n=86)	Spinal Anesthesia (n=92)	P-value
Level of surgery			
* L3-L4	9 (10.5%)	7 (7.6%)	
* L4-L5	50 (58.1%)	59 (64.1%)	
* L5-S1	27 (31.4%)	26 (28.3%)	
Indication for surgery			
*Degenerative	39 (45.3%)	45 (48.9%)	
*Isthmic	16 (18.6%)	17 (18.5%)	
*LCS with instability	20 (23.3%)	22 (23.9%)	
*PIVD	11 (12.8%)	8 (8.7%)	
Duration of Surgery (±SD) min	148.95±17.15	147.55±12.29	0.589, NS
Blood Loss (±SD) ml	111.22±111.74	108.69±108.45	0.879, NS
Time of Entering OT to incision (min)	41.80±32.39	27.55±5.27	0.001*
Time from Bandaging to exit	16.98±4.96	6.85±3.03	0.001*
Post Anesthesia Care Unit (PACU) min	57.14±19.35	36.79±7.32	0.001*
Hospital stay (days)	3.05±0.67	1.61±0.55	0.001*

None of the 92 patients needed conversion to general anaesthesia (GA) or had an episode of high/complete sympathetic blockade. No incidences of Bagai (vasovagal) syncope, post-op meningism, headache or Cerebrospinal Fluid (CSF) flow, intraoperative dural CSF leak, or postop fistula were noted.

Reduced incidences of PONV in SA group (7.6%) when compared with GA group (15.1%). Overall incidence of urinary retention was 20.7% in SA group patients when compared to 5.8% in patients who received GA. There were 2 incidences of failed spinal which were easily managed with a lower dose repeat spinal. Overall better postop analgesia and higher patient and surgeon satisfaction compared to GA was



observed.

In conclusion, surgery on the lower thoraco-lumbar spine can be safely performed under general or regional anaesthesia. Patient's satisfaction and the ability to carry out prolonged operations in the prone position without airway compromise are advantages of using general anaesthesia (GA) [1, 2]. On the other hand, the most important advantages of SA spinal anaesthesia are providing of controlled hypotensive anaesthesia consequently improving operative conditions with bloodless surgical field, decreased intraoperative blood loss with decreased postop blood transfusions, decrease in perioperative cardiac ischemic incidents, postoperative hypoxic episodes, arterial and venous thrombosis, and overall, better postoperative pain control. Furthermore, as the patients can position themselves while they are awake leads to prevention of brachial plexus and other nerve injuries, pressure necrosis of face, glossitis, and post-operation vision loss (POVL) [3, 4, 5, 6, 7].

Also Furthermore, as per Scott et al. [8-10], pulmonary complications were more common in patients who underwent GA compared with regional anaesthesia. In support, two retrospective studies conducted showed that SA resulted in better outcome compared with GA in patients who underwent surgeries on lumbar spine [9, 10].

Along with the ease of administration, SA spinal anaesthesia has rapid onset and reversal of effects. It also helps maintain stable haemodynamic throughout the surgical duration without need to increase blood transfusion. It also avoids the polypharmacy and undue drug related complications associated with GA. Lastly Finally, as it decreases recovery room stay with reduced post-operative pain, nausea, vomiting, and requirement for additional analgesics, SA Spinal anaesthesia again proves as an excellent choice.

Advantages of SA versus GA [11, 12, 13, 14, 15].

Despite encouraging results in favour of SA, SA does not come without risk, and there is (at least to date) no clear evidence to delineate the difference in morbidity and mortality between the two approaches [7]. Besides considering specific risks of SA itself, one must consider the context in terms of the type of surgery to estimate the real risk better.

Conclusion

SA is effective for use in patients undergoing elective lumbar spine surgeries and very efficient alternative technique to GA. SA offers efficient operating room functioning with decreasing overall operation theatre time and shown to be the more convenient anaesthetic choice in the perioperative setting.

It can be said that regional anaesthesia has proved as a powerful weapon for anaesthesiologists to tackle any adverse situation and provided an excellent opportunity to bring their best Endgame to face any crises recently in the form of COVID-19.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of Interest: NIL; **Source of Support:** NIL

References

1. Demirel CB, Kalayci M, Ozkocak I, Altunkaya H, Ozer Y, Acikgoz B. A prospective randomized study comparing perioperative outcome variables after epidural or general anesthesia for lumbar disc surgery. J Neurosurg Anesthesiol. 2003;15:185–192.
2. De Rojas JO, Syre P, Welch WC. Regional anesthesia versus general anesthesia for surgery on the lumbar spine: a

review of the modern literature. Clin Neurol Neurosurg. 2014;119:39–43.

3. Pflug AE, Halter JB. Effect of spinal anesthesia on adrenergic tone and the neuroendocrine responses to surgical stress in humans. Anesthesiology. 1981;55:120–126
4. 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.
5. McLain RF, Bell GR, Kalfas I, Tetzlaff JE, Yoon HJ. Complications associated with lumbar laminectomy: a comparison of spinal versus general anesthesia. Spine (Phila Pa 1976). 2004;29:2542–2547.
6. McLain RF, Tetzlaff JE, Bell GR, Uwe-Lewandrowski K, Yoon HJ, Rana M. Microdiscectomy: spinal anesthesia offers optimal results in general patient population. J Surg Orthop Adv. 2007;16:5–11.
7. Available at: https://www.nysora.com/techniques/neuraxial-and-perineuraxial-techniques/spinal-anesthesia/
8. Scott NB, Kehlet H. Regional anaesthesia and surgical morbidity. Br J Surg. 1988;75(4):299–304.
9. Attari MA, Mirhosseini SA, Honarmand A, Safavi MR. Spinal anesthesia versus general anesthesia for elective lumbar spine surgery: a randomized clinical trial. J Res Med Sci. 2011;16:524–529.
10. Brown MJ. Anesthesia for elective spine surgery in adults. 2015. Available from: https://www.uptodate.com/contents/anesthesia-for-elective-spine-surgery-in-adults. Accessed July 26, 2017.
11. Modig J, Karlstrom G. Intra- and post-operative blood loss and haemodynamics in total hip replacement when performed under lumbar epidural versus general anaesthesia. Eur J Anaesthesiol. 1987;4(5):345–55.
12. Urwin SC, Parker MJ, Griffiths R. General versus regional anaesthesia for hip fracture surgery: a meta-analysis of randomized trials. Br J Anaesth. 2000;84(4):450–5.
13. Indelli PF, Grant SA, Nielsen K, Vail TP. Regional anesthesia in hip surgery. Clin Orthop Relat Res. 2005;441:250–5.
14. Sakura S. Epidural anesthesia and spinal anesthesia in the elderly. Masui. 2007;56(2):130–8. [In Japanese]
15. Kao FC, Tsai TT, Chen LH, et al. Symptomatic epidural hematoma after lumbar decompression surgery. Eur Spine J. 2015;24:348–357

Conflict of Interest: NIL
Source of Support: NIL

How to Cite this Article

Waradkar S, Mehmood A, Raut S, Kundnani V. Moving toward Regional Anesthesia for Spine Surgery - Need of the Hour. Journal of Clinical Orthopaedics Jul-Dec 2022;7(2):38-42.