

CASE REPORT

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# Thoracic spinal anesthesia for cesarean section in severe pre-eclampsia: exploring a new dimension

Rajeev Chauhan, Pranshuta Sabharwal, Rashi Sarna\*  and Shyamcharan Meena

## Abstract

**Background:** Severe pre-eclampsia poses a dilemma for the anesthesiologist especially in emergency situations where cesarean deliveries are done for the un-investigated or partially investigated parturient. Hemodynamic stability is the major goal of anesthetic management of these patients. Thoracic spinal anesthesia has been successfully given for various surgeries like breast cancer and abdominal cancer but not for cesarean section.

**Case presentation:** We report a case of a 35-year-old at 33<sup>+5</sup>-week period of gestation with severe pre-eclampsia and bullous lesions managed successfully with segmental thoracic spinal anesthesia. General anesthesia in this patient could have been risky as the patient was not fasting; airway bullous lesions could not be ruled out and Mallampati grade was III on airway examination. Presence of lesions in lumbar region precluded the lumbar spinal technique. The technique was associated with an adequate level of the sensory block during lower segment cesarean section, a high degree of hemodynamic stability, and a high patient satisfaction

**Conclusion:** Segmental thoracic spinal anesthesia can be used successfully and effectively for lower segment cesarean section by experienced anesthetists. Further studies are warranted to compare its effect, especially on hemodynamics with known techniques.

**Keywords:** Pre-eclampsia, Thoracic spinal, Hemodynamic stability

## Background

Preeclampsia is a hypertensive disorder complicating 5% to 7% of all pregnancies. The best anesthetic technique for cesarean delivery in such cases is regional anesthesia. The administration of regional anesthesia (RA) not only avoids the maternal complications with GA like difficult intubation, vasopressor response to intubation, but also improves uteroplacental blood flow and neonatal outcome. However, emergent situations can pose a dilemma for the proper anesthetic technique due to varied concerns of the patient.

We report an unbooked case of severe pre-eclampsia with a bullous lesion of pemphigus foliaceus in the lumbar region managed successfully with thoracic spinal

anesthesia. Segmental spinal anesthesia has been given before for abdominal cancer, breast cancer surgeries, and laparoscopic cholecystectomy successfully but never given to obstetric patients.

## Case presentation

A 35-year-old with BMI 33 kg/m<sup>2</sup> at 33<sup>+5</sup>-week period of gestation with a history of severe preeclampsia presented for emergency lower segment cesarean section (LSCS) in view of reversal of end-diastolic flow (REDF) in uterine artery. At pre-anesthetic assessment, we came to know that the patient had taken solid food 4 h earlier, and her non-invasive blood pressure (NIBP) readings during the last few hours of admission in the records were in the range of 180–210/110–20 mmHg, and on airway assessment, she was Mallampati grade III. She also had crusted lesions on her back in the lumbar

\* Correspondence: [sarnarashi@yahoo.com](mailto:sarnarashi@yahoo.com)

Department of Anesthesia and Intensive Care, Post Graduate Institute of Medical Education and Research, 160012 Chandigarh, India

region and on extremities. When her basic investigation was sent, the dermatology consultation revealed the lesions to be pemphigus foliaceus. Though oral lesions could not be seen. Therefore, we planned for regional anesthesia along with backup for general anesthesia in case of any inadvertent event. We considered two options either lumbar spinal or thoracic segmental spinal anesthesia. Presence of lesion in the lumbar region precluded the option of lumbar spinal. Considering the high degree of hemodynamic stability and expertise available, we decided to go for segmental thoracic spinal anesthesia after taking written informed consent from the patient. Noninvasive monitoring including NIBP, heart rate (HR), pulse oximetry (SpO<sub>2</sub>), electrocardiograph (ECG), and 18G intravenous access on the left upper limb was established. An invasive arterial line was put in a left radial artery for the beat-to-beat BP monitoring. Forty milligrams of labetalol was given intravenously, and the patient had already received magnesium sulfate before being shifted to the operation theater.

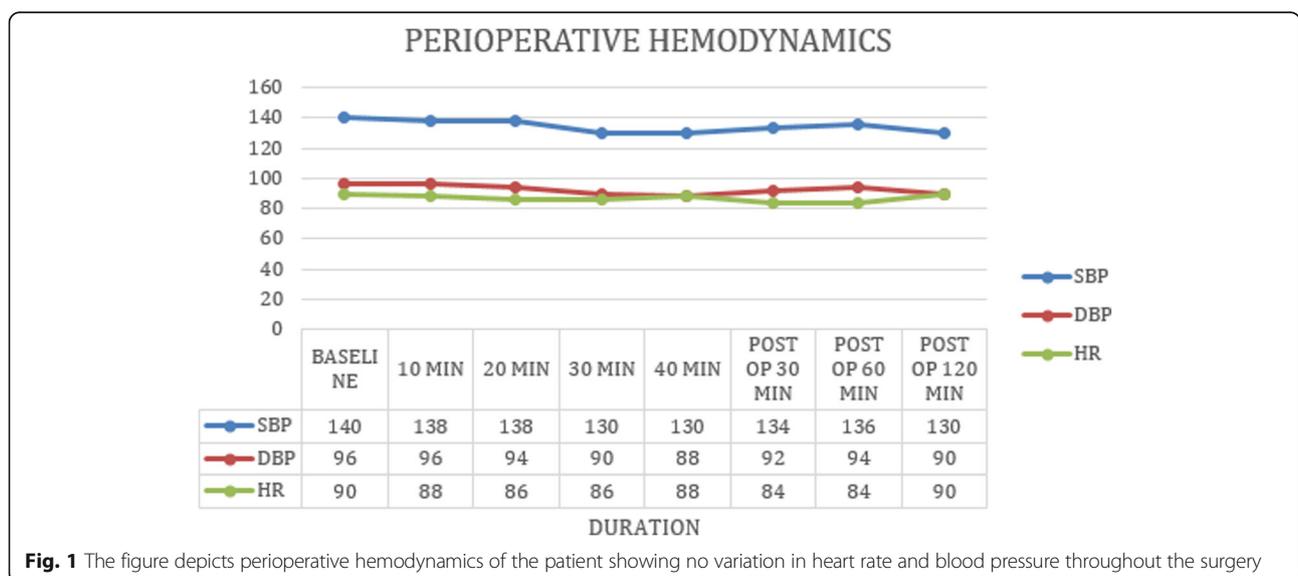
Under aseptic precautions, subarachnoid block (SAB) was given in the left lateral position at T8–T9 level with 26G Quincke needle with 1.2 ml of 0.5% heavy bupivacaine and 20 µg of fentanyl. The advancement of the needle was slow and cautious as the combined spinal-epidural set could not be arranged. The patient did not complain of any paresthesia during needle advancement. The patient was laid supine and oxygen was supplemented with a venturi mask. After 5 min, the effect of the block was assessed with a pinprick, and a segmental sensory block extending till the level of T4 to L2 was achieved without any respiratory compromise. On re-assessment, after 15 min, the level of the block was found to be the same. Intraoperative hemodynamics

were stable with no requirement of any vasopressors throughout the surgery. The patient complained of no respiratory distress and maintained saturation of 98–99% throughout the surgery. The baby was born with an APGAR score of 10 at 1 and 5 min after delivery with no obvious skin lesions. Intraoperative blood loss was 800 ml and urine output was 100 ml. Surgery was completed in 45 min, and the patient was shifted back to the labor room with stable vitals. In the post-operative period, hemodynamics (Fig. 1) were monitored and the patient was followed up for any neurologic deficit or any other complaint till the date of discharge from the hospital, and none was reported.

**Discussion**

In the presence of pemphigus lesions, infiltration with local anesthesia should be avoided as it could have resulted in bulla formation at the injection site (Abouleish et al. 1997) which was done in our case. An area devoid of skin lesions is recommended and considered safe for performing a lumbar puncture (Prasad and Chen 1989). In this case, segmental thoracic spinal anesthesia was found to be successfully performed with an adequate level of the sensory block during the lower segment cesarean section. The technique was associated with a high degree of hemodynamic stability and high patient satisfaction.

Anesthesiologists are afraid to perform spinal anesthesia above the termination of the spinal cord due to fear of injuring the spinal cord from the needle point. In an earlier case report, it was noted that the thoracic segment of the cord lies anteriorly, albeit an observation made in the supine, extended position (Van Zundert et al. 2006). In this case, a lumbar puncture was performed in the lateral



**Fig. 1** The figure depicts perioperative hemodynamics of the patient showing no variation in heart rate and blood pressure throughout the surgery

flexed position, but it seems unlikely that canal flexion would change the situation, a view supported by a recent MRI study showing that the position of the conus medullaris changes little in moving from the anatomical to the flexed lateral position (Fettes et al. 2006). Another concern with the thoracic subarachnoid block is a hemodynamic or respiratory compromise due to the block of cardio-accelerator fibers or intercostal nerves, respectively. Van Zundert et al. proved the initial feasibility of segmental spinal anesthesia in laparoscopic cholecystectomy using the T-10 level for performing the block in 20 patients. The block was successful in all patients. The upper sensory block level obtained was T2–T4 with minimal hemodynamic changes and no respiratory complications (Van Zundert et al. 2007). However, the thoracic block will affect the anterior abdominal wall muscles which are responsible for the forceful expiration and coughing, due to the thoracic origin of its nerve supply (Standing 2005; Freund et al. 1967).

Thoracic spinal offers some advantages of good muscle relaxation, in a conscious patient and a fast postoperative recovery. Minor doses reduce the gravity effect and incidence of hypotension during the block. Another advantage in relation to the conventional doses is the faster recovery time (shorter motor block—longer sensory block). The total amount of CSF in the thoracic segment is less in comparison to the lumbar and cervical segment (Hogan et al. 1996), and the thoracic radicles are thinner as compared to the lower or upper ones (Hogan 1996). So, there is a lesser dilution of the anesthetic drug per segment of the distance from the site of injection, and the rootlets are easily blocked due to their small diameter, both factors contributing to good block. Comparing conventional doses of hyperbaric bupivacaine and lumbar puncture with half the dose in the thoracic injection the onset time to reach T-3 level is reduced (Imbelloni et al. 2011). The duration of motor and sensory block, incidence of hypotension, and capability to move themselves to the transport cart (stretcher) were significantly shorter with the smaller dose and thoracic approach (Imbelloni et al. 2011).

Considering the injection at the thoracic level instead of lumbar level, particularly for abdominal surgeries, ensures the appropriate distribution and the highest concentration of the injected opioid and local anesthetic to the pertinent dermatomal level where the surgery is carried on (Van Zundert et al. 2007).

Clearly, patients receiving this technique must be assessed very carefully and managed by anesthetists with considerable experience of regional anesthesia. It may be argued that this particular patient could have been managed using other anesthetic techniques. However, segmental thoracic spinal was chosen because of personal familiarity with a highly reliable technique which can

provide a profound block for the surgery. There is never a “right” way to anesthetize such a patient, but what is described here is an option to expand the boundaries of regional anesthesia by performing spinal anesthesia in the thoracic region in a new way which may be to the advantage of certain high-risk patients.

## Conclusion

Segmental thoracic spinal anesthesia can be used successfully and effectively for lower segment cesarean section by experienced anesthetists. Further studies are warranted to compare its effect, especially on hemodynamics with known techniques.

## Abbreviations

RA: Regional anesthesia; LSCS: Lower segment cesarean section; REDF: Reversal of end-diastolic flow; NIBP: Non-invasive blood pressure; HR: Heart rate; SpO<sub>2</sub>: Pulse oximetry; ECG: Electrocardiograph; SAB: Subarachnoid block

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## Authors' contributions

RS: This author helped with the concept, design, writing, and editing. RC: This author helped with design, literature search, writing, manuscript review, and editing. PS: This author helped with manuscript preparation and editing. SM: This author helped with manuscript preparation and editing. All authors have read and approved the manuscript.

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## Declarations

### Ethics approval and consent to participate

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### Consent for publication

Yes.

All patients included in this research gave written informed consent to publish the data contained within the study.

### Competing interests

The authors declare that they have no competing interests.

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