



Reappraising the Safety of Thoracic Segmental Spinal Anesthesia: Addressing Concerns of Neurological, Cardiovascular, and Respiratory Compromise

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Dear Editor,

Thoracic segmental spinal anesthesia (TSSA) has recently re-emerged as a feasible and safe alternative to conventional lumbar spinal and general anesthesia for specific surgical procedures.¹ Despite a growing body of evidence supporting its efficacy, a certain clinical hesitation persists. Concerns regarding spinal cord injury, the blockade of cardioaccelerator fibers, and potential respiratory compromise continue to act as barriers to its wider adoption.² We wish to revisit these concerns, framing them within our modern understanding of anatomy, technical refinements, and available evidence to argue that TSSA is not just an experimental niche, but a safe, evolving practice.

The most feared complication for many clinicians remains the potential of direct spinal cord injury. However, the perceived risk often outweighs the anatomical reality. Magnetic resonance imaging and detailed anatomical studies reveal that the spinal cord typically lies more anteriorly within the canal, particularly in the mid-thoracic region. This leaves a measurable posterior cerebrospinal fluid (CSF) cushion that provides a vital safety margin for midline needle insertion.³ Beyond anatomy, our technical safety net has also evolved over time. The use of fine-gauge needles, enhanced precision in needle placement, and the practice of performing the block in awake or minimally sedated patients, allowing for immediate feedback can significantly mitigate the risk of neural trauma. Large clinical series now reflect an exceedingly low incidence of neurological complications, suggesting that while the theoretical risk demands respect, it should not preclude the use of the technique in indicated cases when performed with the appropriate expertise.⁴

Hemodynamic stability is another frequent point of debate, specifically the blockade of cardioaccelerator fibers (T1–T4). However, unlike the all-or-nothing spread often seen in lumbar spinal anesthesia, TSSA is inherently segmental. By utilizing lower doses of local anesthetics, we can effectively limit the block spread.⁵ In our experience, the combination of careful drug titration, judicious selection of baricity, and maintaining euvolemia transforms hemodynamic management from a source of anxiety into a predictable, manageable part of the procedure.

Finally, the concern regarding respiratory compromise, often attributed to intercostal muscle paralysis merits a nuanced view. Since the diaphragm is innervated by the phrenic nerve (C3–C5), the primary driver of ventilation remains unaffected in TSSA. When dosing is precise, the impairment of accessory respiratory muscles is minimal.⁶ It is worth noting that what is often labeled as respiratory depression in these cases is frequently a byproduct of over-sedation rather than the block itself. While cautious patient selection remains the cornerstone of practice, TSSA can be remarkably well-tolerated even in those with limited pulmonary reserve.

Available evidence supports that the TSSA is a feasible anesthetic technique in certain high-risk cases. A thorough understanding of thoracic spinal anatomy, meticulous technique, appropriate patient selection, and vigilant monitoring are central to minimizing risks. As experience with TSSA continues to expand, it is increasingly evident that many of the traditional concerns stem from extrapolation of lumbar spinal anesthesia principles rather than evidence specific to thoracic techniques. We believe that a balanced appraisal of these factors will facilitate broader acceptance of TSSA and encourage further high-quality studies to consolidate its role in contemporary anesthetic practice.

KEYWORDS: Diaphragm, Hemodynamics, Patient selection, Respiratory insufficiency, Spinal anesthesia.

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