

Segmental thoracic spinal anaesthesia beyond high-risk cases: Are we ready for routine use?

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Spinal anaesthesia has been in the armamentarium of anaesthesiologists for a long time. High spinal anaesthesia was also entertained in resource-limiting centres in the early days, when facilities for general anaesthesia (GA) were not available. An extension of traditional spinal anaesthesia is segmental thoracic spinal anaesthesia (STSA), where a spinal anaesthetic is injected at a low or mid-thoracic level to facilitate upper abdominal and thoracic surgery (mostly breast surgery). In the starting days, STSA was a less-practised option reserved for patients undergoing surgery where they are considered at a greater risk of GA with or without tracheal intubation. However, in recent years, STSA has not only been considered but also popularised as an alternative to GA for upper abdominal and thoracic surgery (mostly breast surgery).^[1-4] Despite the available literature citing the safety, efficacy, and higher satisfaction rates with the STSA technique, many anaesthesiologists continue to express apprehension about the safety of spinal anaesthesia at a higher level (thoracic level). The major concern for those who are reluctant to accept this new technique of STSA as an alternative to GA is the fear of direct needle injury to the spinal cord and its sequelae, the risk of hypotension/bradycardia due to a high level of sympathetic block and respiratory distress due to a motor block of accessory muscles of respiration, especially in those critically ill patients

who already have a certain degree of respiratory and cardiovascular compromise.

In this context, the cautious approach proposed by the authors^[5] is worth noting; we believe that before considering STSA as an alternative to GA, one should ask two key questions: first, is it the only available alternative? Second, is there sufficient evidence to establish its safety profile over other techniques? A conclusive answer to these two questions is pertinent considering the current age of defensive medical practice, where the risk of financial and reputational loss due to medical litigation cannot be ignored. Let us examine these two questions.

While the available literature does not report the neurological damage due to injury to the spinal cord,^[6] one should remember that often, such incidents are underreported for fear of medical litigation.

Though spinal cord damage due to needle puncture is not yet reported for STSA, traumatic spinal cord injury due to the needle insertion at a point above where the spinal cord terminates has been reported both at T12–L1 and T11–12 interspaces.^[7,8] Even direct trauma to the spinal cord has been reported in obstetric cases where a Whitacre needle was advanced a bit further at an L2–L3 interspace.^[9] One should remember that even a minor injury to the spinal

cord at the thoracic level may be further aggravated by spinal anaesthesia-induced hypotension resulting from a high-level sympathetic block.^[10]

A large-scale observational study involving 2,074 patients, as reported by Chandra *et al.*^[12] looking for the feasibility of thoracic spinal anaesthesia in laparoscopic cholecystectomy in the American Society of Anesthesiologists physical status 1 and 2 patients reported the incidence of hypotension, bradycardia and nausea as 18%, 13% and 10%, respectively. This observational study echoes the same problem observed in a meta-analysis conducted 6 years back, where the odds of developing intraoperative hypotension and bradycardia were 4.61 [95% confidence interval (CI) 1.70, 12.48, $P = 0.003$] and 6.67 (95% CI 2.02, 21.96, $P = 0.002$), respectively. In addition, the meta-analysis observed a 25% incidence of shoulder pain intraoperatively in the neuraxial anaesthesia group.^[11] It is obvious that these patients will remain less satisfied with STSA as an anaesthetic technique. However, the incidence of shoulder pain was only 6% in Chandra *et al.*'s study, and 94% of the study subjects were 'very satisfied' with the procedure.

One of the major reasons to use STSA is to avoid the complications of GA with or without tracheal intubation in high-risk patient populations. However, a recent meta-analysis comparing STSA with general endotracheal anaesthesia (GETA) revealed that patients in the STSA group remained highly anxious and needed additional sedation to overcome anxiety and discomfort.^[12] Titrating sedation and using a rescue vasopressor in a patient with already compromised respiratory and cardiovascular function carries risks, which may outweigh the risks associated with general endotracheal anaesthesia (GETA) in a controlled environment or undermine the perceived benefits in terms of patient satisfaction in the setting of STSA.

The good part of STSA in this meta-analysis was superior postoperative analgesia and reduced need for total and rescue opioids, but all at the cost of high odds of developing intraoperative hypotension and bradycardia.^[12] The only perceived benefit of surgeons' satisfaction with STSA, as observed in an Indian study, does not align with the observations made in this analysis, where surgeons remain dissatisfied with the sudden, unpredictable cautery twitches during axillary lymph node clearance.

The dilemma of whether or not to use STSA as an alternative to GA for routine upper abdominal and thoracic surgery will continue to stay till a more systematic review clearly outlines its benefits and addresses the genuine concerns of anaesthesiologists regarding the medicolegal risks, as in the current era, the hospital expects anaesthesia to be complication-free and complications due to anaesthesia are unacceptable to patients and surgeons. We are glad that a technique like STSA has been added to the armamentarium of anaesthesiologists; however, for now, it should be reserved for a select group of patients and specific types of surgeries until more robust data become available.

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