

CORRESPONDENCE

Utilising high-volume spinal anaesthesia as an alternative to general anaesthesia: lessons from Gaza

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Editor—The scarcity of medical resources available amidst the Israeli military assault on Gaza necessitates innovative approaches to healthcare delivery. The downstream humanitarian catastrophe, a direct consequence of the blockade of the Gaza Strip, which has tightened over the last 18 months, has resulted in shortages of basic medical supplies and equipment, with pallets of aid trucks stuck at checkpoint crossings indefinitely and limited amounts of supplies permitted intermittently.^{1–3} Such resource scarcity, coupled with the widespread destruction of civilian infrastructure and hospitals, including the abduction, torture, and killing of healthcare workers and trained specialists, has driven the remaining local medical professionals to adapt by developing innovative techniques to ensure patient safety during surgery.^{4–10} A previous study of Médecins Sans Frontières (Doctors Without Borders) services found that spinal anaesthesia was the most common anaesthesia technique in resource-limited settings.¹¹ One such spinal technique, specifically high-volume spinal anaesthesia (HVSA), emerged as a practical alternative to general anaesthesia under constrained circumstances.^{12,13}

HVSA proved to be an efficient alternative in surgeries performed in the European Gaza Hospital (EGH) in Khan Yunis by visiting physicians during medical mission trips in April–May 2024, together with local Palestinian healthcare workers and anaesthesiologist/anaesthesia technicians.

Anaesthesia practice had to be tailored because of a severe shortage of airway supplies, which necessitated reuse of laryngeal mask airways. A shortage of analgesia medications, particularly opioids, required use of regional anaesthesia for pain management amidst an overflow of hospital capacity stemming from complex fractures, blast injuries, and gunshot wounds streaming into hospitals. Ventilators colonised with drug-resistant organisms further incentivised use of regional anaesthesia for operative procedures.

HVSA is primarily aimed at providing effective sensory and motor block for thoracoabdominal surgeries, procedures that would normally require general anaesthesia (Fig 1). Another technique that can be considered is thoracic spinal anaesthesia, which has also been used in resource-limited settings for certain thoracoabdominal surgeries to avoid general anaesthesia and associated complications.¹⁴ Neuromuscular blocking agents and specialised drugs necessary for general anaesthesia maintenance were difficult to procure in Gaza for any effective scalable intervention given the sheer number of casualties. Another key driver behind the shift to HVSA was the need to minimise postoperative respiratory complications, as follow-up care is virtually nonexistent in Gaza because of communication blackouts, bed shortages, and frequent displacement.¹⁵ The shortage of remaining personnel trained in airway management meant that avoiding tracheal intubation and ventilator use was imperative. The absence of reliable



Fig 1. High-volume spinal anaesthesia administration in European Gaza Hospital for an upper abdominal procedure. Consent to participate: the patient provided consent for the use of his photos.

ventilators meant that even when general anaesthesia was used, patients faced significant postoperative and intraoperative risks, especially in terms of respiratory depression.

A critical component of the success of the utilisation of HVSA in Gaza was the scarcity of the local available anaesthetic solution, which influences its spread within the intrathecal space. The high spinal anaesthesia procedure was refined through several critical adjustments to achieve optimal effectiveness in a constrained setting. The anaesthetic mixture used consisted of 2.5 ml of bupivacaine 0.5% and 2.5 ml of distilled water, totalling 5 ml. This approach aligns with a prior investigation that suggests that increasing the volume or concentration of local anaesthetic while maintaining the same dose does not significantly affect the final sensory level or duration of spinal block.¹⁶ Spinal anaesthesia was administered at the L2–L3 level with a 22-G spinal needle with the bevel orientated cephalad. The local anaesthetic solution was injected slowly over the course of 2 min to allow even distribution and avoid abrupt haemodynamic changes. After injection, patients were instructed to remain in a sitting position for 7–10 min to facilitate fixation of the anaesthetic block. Once spinal anaesthesia was achieved, the patient was placed supine to prepare for surgery. This technique was critical in minimising the need for advanced airway management as it reduced the risk of respiratory complications. Achieving haemodynamic stability was also a key consideration as hypobaric spinal anaesthesia tends to cause less dramatic hypotension compared with hyperbaric solutions. Although hypotension is still a common side effect because of the sympathetic block associated with spinal anaesthesia, it was generally managed with fluids, and infrequently with vasopressors, without the need for advanced cardiovascular monitoring.

In practice, we used HVSA for both acute trauma patients, including gunshot, blast, and shrapnel injuries, and for more subacute oncological or general surgical procedures such as colostomy, colon resection, cholecystectomy, and laparotomies for obstruction or tumour resection. Patients we observed who underwent surgery with HVSA demonstrated

substantially quicker recovery times compared with those receiving general anaesthesia. This is consistent with findings from other resource-limited settings, where spinal anaesthesia, when used appropriately, reduces postoperative nausea, vomiting, and respiratory complications.¹⁷ HVSA also facilitated earlier ambulation and discharge, which is crucial in Gaza because of limited bed capacity and the need for turnover times to be minimised.

There were some notable challenges with the use of HVSA in such an acute crisis zone. One such issue was the limited ability to control visceral pain during upper abdominal surgeries, particularly in the absence of opioids such as fentanyl, which were unavailable at the time. This limitation meant that although HVSA effectively blocked somatic pain, some patients experienced discomfort because of inadequate visceral coverage. Additionally, the risk of anxiety in patients who were more awake during the procedure required careful management. Without the full sedation provided by general anaesthesia, some patients became anxious or uncomfortable, particularly having been aware of sensations during surgery.

Our experience in Gaza demonstrates that HVSA can have benefits beyond being a stop-gap measure in resource-constrained settings as a powerful technique that could reshape anaesthesia practices in these settings globally. Our observations revealed that HVSA provides a safe alternative to general anaesthesia by minimising the need for advanced airway management and postoperative care, while offering better haemodynamic stability and faster recovery times. These factors make it particularly valuable in environments with limited monitoring equipment, trained anaesthesia staff, and medications required for general anaesthesia.

There are certain challenges that remain and continue to pose hurdles to the effective delivery of care. The absence of certain medications, such as opioids for visceral pain control and patient anxiety during awake procedures, highlight that there is still a need for further research and potential refinement of this method, especially in the case of Gaza. Future medical teams using this method should focus on attempting to assess the long-term safety of HVSA, particularly its

neurological impact, and thereby optimising protocols to manage these risks more effectively. With appropriate training and infrastructure development, HVSA could become widely adopted, not only in acute conflict-stricken regions, but also in other resource-limited settings, as it offers a valuable tool for global health initiatives in surgical care. Although clinical adoption is often necessary for practical reasons, this should advance in tandem with efforts to address the underlying causes of scarcity, in this context the ongoing blockade, military occupation, and warfare that has devastated the healthcare infrastructure in Gaza and disrupted essential medical services.^{5–7,18,19}

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Declaration of interest

The authors declare that they have no conflicts of interest.

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