



Inadvertent sterile water injection in the epidural space: history revisited

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Letter to the Editor

Korean J Anesthesiol 2020;73(6):562-563
<https://doi.org/10.4097/kja.19100>
pISSN 2005-6419 • eISSN 2005-7563

Received: March 11, 2019

Revised: April 7, 2019 (1st); April 23, 2019
(2nd); May 18, 2019 (3rd); May 28, 2019 (4th)

Accepted: May 30, 2019

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The epidural space can be identified using various methods, with loss of resistance (LOR) to air and saline being the most common method. Air used in the LOR technique for identifying the epidural space can cause pneumocephalus; therefore, the use of saline, although less sensitive than the former technique, is being advocated. We report a case of unbearable and excruciating pain after passage of an accidental bolus of preservative-free sterile water through the epidural catheter.

A 45-year-old female patient with a weight of 56 kg and height of 160 cm (body mass index: 21.9 kg/m²) was scheduled to undergo total abdominal hysterectomy for a fibroid uterus under general anesthesia with epidural analgesia. On arrival in the operation theater, following conformance with the surgical safety checklist, the monitors were connected to the patient, and the baseline values were recorded. Epidural catheter insertion was planned in the sitting position, and the insertion site was prepared. Under aseptic conditions, an 18 gauge epidural needle was inserted in the L3-L4 space after administering local anesthesia in the space. The epidural space was identified with the LOR-to-air (2 ml) technique followed by insertion of the epidural catheter. As the catheter was inadvertently flushed with 2 ml of sterile water (Aishwarya Lifesciences, Solan HP, India) by the anesthesia resident, considering it to be as innocuous as saline, the patient winced and arched her spine and complained of unbearable excruciating pain in the back. Pain was accompanied by sweating and resulted in a 25% increase in the heart rate and blood pressure from the baseline values. The catheter was immediately flushed with the local anesthetic solution (3 ml of 2% of plain lignocaine), which relieved the pain gradually in > 2 minutes. The patient was then positioned supine after securing the catheter. The remaining intraoperative period was uneventful. The epidural catheter was removed on the second postoperative day, and the patient was discharged on the seventh postoperative day with no neurological sequelae.

The osmolarity of the fluid being used could account for the development of pain on injection of fluid in the epidural space. The development of pain after injection of sterile water could be explained by the stimulation of type C nociceptive fibers by hypo-osmolar fluid-like sterile water with zero osmolarity, resulting in severe burning sensation in the back [1]. Similar pain was observed during the infusion of the hypertonic saline used in the study for epidural adhesiolysis in cases of epidural fibrosis [2]. This observation reiterates the impact of the osmolarity of the fluid in invoking pain on injection in the epidural space.

Preservative-free sterile water, as described in literature by Lund, was used to identify the epidural space as it invoked pain and discomfort once it entered the epidural space. Mayhew [3] agreed with the findings of Lund and reported no neurological sequelae but dissuaded the use of sterile water as a solution for identifying epidural space, considering the patients' comfort. Cohn and Levesque [4] observed that intense pain was experienced

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when sterile water mixed with a steroid was injected in the epidural space; however, injection of the same steroid mixed with saline did not result in pain. A recent literature search for similar events yielded only one study where 4 ml of distilled water was accidentally injected in the epidural space for labor analgesia and generated severe pain in the lower back, which was relieved after injection of a local anesthetic solution, as was observed in our index case [5]. Following this incident, an immediate internal audit was performed in our department, and remedial measures were adopted to circumvent such errors in the future by issuing directives against the use of sterile water in any form in the operation theater.

To conclude, when saline is used for identifying the epidural space, extreme caution must be exercised to prevent inadvertent administration of sterile water, which can result in the development of unbearable pain in the patient and may potentially evoke dissatisfaction towards the anesthesia technique.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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Deepak Dwivedi (Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Writing – original draft; Writing – review & editing)

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