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CORRESPONDENCE REGIONAL ANESTHESIA

Incidental epidural fluid collection – differential approach considerations

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ABSTRACT

When patient care requires spinal/epidural needle re-entry at the same level as a recent spinal/epidural procedure, clear fluid may appear at the needle hub. This fluid has a differential: it may be iatrogenic, cerebrospinal fluid that leaked following a prior dural puncture, or cerebrospinal fluid freshly drawn from the spinal column. To date, there is no clear guideline on how to navigate this situation. In this brief case series, we present two distinct clinical scenarios that require properly identifying the source and nature of this fluid. We also highlight the lack of a standardized approach to differentiating clear fluid at the spinal/epidural needle hub, discuss our thoughts on how this can be rectified and what point-of-care tools may be useful.

Key words: Case Report; Epidural Anesthesia; Epidural Blood Patch; Point-Of-Care Testing; Spinal Anesthesia

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Highlights

- Mistaking an epidural collection for spinal fluid can lead to adverse outcome
- No major guideline addresses how to differentiate CSF from iatrogenic fluid
- If the clear fluid is seen at the needle hub, consider re-confirming epidural space
- Differentiating CSF from normal saline is possible with point-of-care tools

INTRODUCTION

In a patient with a recent spinal/epidural procedure, who now requires re-introduction of a spinal/epidural needle for further management, clear fluid at the needle hub presents a diagnostic dilemma to the anesthesiologist. Epidural fluid collection may form inadvertently following spinal surgery or lumbar puncture (intentional or accidental). It may also be deliberately introduced by the anesthetist during an epidural catheter placement when using a saline loss-of-resistance (LOR) technique, or when local anesthetic is delivered to the epidural space.

In this situation, clear fluid at the needle hub may represent either a) iatrogenic fluid, b) cerebrospinal fluid (CSF) that leaked after a previous procedure or c) intrathecal CSF from a new dural puncture. Evolving literature exists on differentiating local anesthetic,[1-3] and normal saline[4] from CSF; however, none of the tests discussed are currently standard of care in a major guideline. To our knowledge, there is no mention of fluid from prior CSF collection versus CSF from new dural puncture. Although diagnostic imaging may be helpful to identify an epidural collection, this may not be practical in an emergency setting (Ex. cesarean sections) or be cost-effective. Below we discuss two situations of uncertainty regarding the fluid seen at the needle hub and discuss our thoughts on how the above-mentioned literature could be integrated into real-life clinical scenarios to help improve clinical outcomes.

Case 1: Ineffective spinal anesthesia due to misidentification of thecal space

A 28-year-old primigravida at 40 weeks gestation presented for spontaneous vaginal delivery. Her past medical history was unremarkable. An epidural catheter was placed successfully at L3-4 interspace and analgesia was established using 0.2% ropivacaine and fentanyl 2

µg/ml infusion at a rate of 10 ml//h, and a patient-controlled bolus of 4 ml with a 15 min lockout interval. An urgent cesarean section was planned due to non-reassuring fetal tracing. Epidural catheter was topped up with 5 ml of 2% lidocaine and the catheter was removed after inadequate sensory level on the operating table. The epidural injection was deemed ineffective and spinal anesthesia using a 25-gauge pencil-point spinal needle was attempted. Clear fluid was seen at spinal needle hub, and subsequently 1.4 ml of 0.75% hyperbaric bupivacaine in combination with 15 µg fentanyl and 150 µg of Duramorph was placed in what was presumed to be intrathecal space after confirming. Patient was placed supine and levels were checked. Patient was feeling numb to T10 levels bilaterally but felt sharp pain with surgical Allis forceps. As a result, the procedure was done under general anesthesia and patient was discharged home 2 days later with no further complications. In retrospect, this lack of response was likely caused by misidentification of the intrathecal space. The clear fluid at the needle hub was likely the anesthetic solution from the epidural catheter placed earlier.

Case 2: Epidural blood patch with fluid collection in epidural space

A 34-year-old gravida 3 para 4 at 40 weeks gestation, presented in early labor to our labor and delivery suite for spontaneous vaginal delivery. Her body mass index was 34 kg/m^2, and her past medical history was unremarkable. She had received uneventful epidural labor analgesia for her last delivery. At her request for labor analgesia, epidural access was attempted with a 17 gauge Tuohy needle, first at the L3-L4 interspace, complicated by accidental dural puncture. and then successfully placed at the L2-3 interspace. Analgesia was achieved with ropivacaine 0.2% and fentanyl 2 µg/ml infusion at a rate of 10 ml/h and a patient-controlled bolus of 4 ml with a 15 min lockout interval. On the first postpartum day, the patient complained of a positional headache, 8/10 in severity, with headache getting worse on sitting up and improving by lying flat. A diagnosis of post dural puncture headache was made; bed rest, good hydration and oral analgesic medication (acetaminophen, ibuprofen and caffeine) provided a partial headache relief for 24 h. An epidural blood patch was planned and after obtaining informed consent, a 17 gauge Touhy needle was placed at L2-3 interspace. The saline loss of resistance technique for epidural space identification was utilized and when epidural space was entered, a clear fluid coming out of the epidural Tuohy needle was noticed. Epidural Tuohy needle was pulled back and re-entered cautiously in epidural space, clear fluid was noticed again. Given the history of post-dural puncture headache and re-confirmation of epidural space, the fluid was deemed to be either CSF leak or normal saline from the LOR technique. An epidural blood patch using 15 ml of autologous blood was given and two hours later she reported significant relief of her headache and was discharged home.

DISCUSSION

Case #1 demonstrated how wrong identification of a potential space can have a harmful effect on the patient – the delivery of medication to the wrong space leads to ineffective analgesia, necessitating the need for general anesthesia. There is limited literature to guide us in a situation, where iatrogenic fluid needs to be differentiated from CSF. In old literature, tests of temperature, presence of glucose, pH, and turbidity when mixed with thiopentone have been assessed in in-vitro studies.[1] Using urine dipsticks, comparisons of local anesthetic to mock CSF demonstrated that glucose and pH tests appear to be most helpful.[1] Those older studies cautioned, however, that no single test is perfect, and suggested the use of a combination of tests. In more recent literature, the use of glucose and pH has been revisited,[3,4] to varying degrees of success. To our knowledge, to date this approach has not been clinically validated.

In the Case 1, availability of a bedside urine dipstick or a glucose monitor may have been helpful to correctly identify that it is local anesthetic, and not CSF that was seen at the needle hub; the needle should have then been advanced further until true CSF was identified. This may have helped avoid the need for a general anesthetic. However, as Hori demonstrates,[2] the iatrogenic local anesthetic fluid located in-situ will approach the glucose level and pH of CSF over time (estimated 60 min in their study until equivalence), suggesting that the window of time for these tests is limited. Intuitively, this is true of temperature as well.

Case 2 represents a different situation, where an additional variable – possible CSF leak – is introduced. To date, the discussion regarding fluid found at spinal needle hub is limited in EBP literature.[5] This is important, as the consequence of intrathecal blood injection can be dire, and lead to a wide array of neurological complications.[5] In this situation, using a urine dipstick or a glucose monitor would have been helpful to confirm the presence of normal saline at the needle hub. However, if glucose was present (or pH physiologic), then a question of CSF leak vs new dural puncture is raised. This situation is not explored in

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literature, and we recommend re-confirming proper needle positioning or an attempt at a different level.

The major limitation of this case report series is that the decisions were made based on provider experience, with no adjunct point-of-care tools. The major strength of this case series is that it highlights an important clinical scenario that is little explored in literature and provides an approach that uses simple, readily available tools.

CONCLUSION

In the absence of clear guidelines, situations of clinical uncertainty can lead to errors in judgment even by experienced providers. There is evolving literature present on the topic of comparing iatrogenic fluid to CSF, but to our knowledge, this is not currently incorporated into a major guideline. Ongoing research is needed to support the use of cheap, readily available objective tests; e.g., urine dipstick, glucose monitor, to help differentiate local anesthetic and saline from CSF at needle hub, to facilitate bedside decision-making and improve patient outcomes.

Conflict of Interest

The authors declare no conflict of interest. The work is self-funded and done under the oversight of the Anesthesiology Residency Program at NYC Health+ Hospitals/Metropolitan, affiliated with the New York Medical College.

REFERENCES

1. Tessler MJ, Wiesel S, Wahba RM, Quance DR. A comparison of simple identification tests to distinguish cerebrospinal fluid from local anaesthetic solution. Anaesthesia. 1994 Sep;49(9):821-2. [PubMed] DOI: 10.1111/j.1365-2044.1994.tb04464.xHori E, Kurita T, Sato S. Time-dependent changes in epidural catheter aspirate after injection of a local anesthetic. J Clin Anesth. 2016 Sep;33:203-7. [PubMed] DOI: 10.1016/j.jclinane.2016.03.060
2. Hori E, Kurita T, Sato S. Time-dependent changes in epidural catheter aspirate after injection of a local anesthetic. J Clin Anesth. 2016 Sep;33:203-7. DOI: 10.1016/j.jclinane.2016.03.060. Epub 2016 May 3. PMID: 27555165.
3. Ikegami H, Hotta K, Toba Y. Distinguishing cerebrospinal fluid from mepivacaine using the pH test in patients undergoing elective cesarean section with combined spinal-epidural anesthesia. JA Clin Rep. 2020 Oct 2;6(1):75. [PubMed] DOI: 10.1186/s40981-020-00383-y
4. Soliveres Ripoll J, Sánchez Morillo J, Balaguer Doménech J, Gallen Martín L, Sánchez Hernández A, Solaz Roldán C. Quantitative test to distinguish spinal fluid from saline solution in combined spinal-epidural anesthesia. Rev Esp Anestesiol Reanim. 2009 Apr;56(4):206-11. [PubMed] DOI: 10.1016/s0034-9356(09)70373-1
5. Russell R, Laxton C, Lucas DN, Niewiarowski J, Scrutton M, Stocks G. Treatment of obstetric post-dural puncture headache. Part 2: epidural blood patch. Int J Obstet Anesth. 2019 May;38:104-118. [PubMed] DOI: 10.1016/j.ijoa.2018.12.005

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