Management of postdural puncture headache in pediatric using an epidural catheter for an epidural blood patch

ABSTRACT
We report the case of an 8-year-old child suspected to have postdural puncture headache after multiple lumbar punctures for collection of cerebrospinal fluid for analysis. His symptoms included headache, nonprojectile vomiting, and lethargy. When conservative management failed, an epidural blood patch was applied and the depth of the epidural space was determined using MRI. Epidural blood patch treatment was successful, and an epidural catheter was left in situ, in case a second patch was required.

Key words: Anesthesia; child; conservative treatment; epidural; epidural blood patch; epidural space; headache; magnetic resonance imaging; postdural puncture headache; spinal puncture, vomiting

Introduction
Postdural puncture headache (PDPH) is a well-known complication following lumbar puncture (LP) in adults; however, it is rare among pediatric patients, partly due to physiological differences including relatively low cerebrospinal pressure in children. The International Headache Society defines PDPH as headache occurring within 5 days after dural puncture and resolving 48 h after epidural blood patch (EBP) or within a week with conservative treatment.[1] PDPH may be underreported as headache can also be caused by primary disease, and its incidence varies in pediatric patients, influenced by factors including needle size and type; for example, 25–27 G cutting-point, 22 G cutting-point, and 22 G pencil-point needles are associated with incidence rates of 1–4%, 15%, and 9%, respectively. The symptoms of PDPH are generally self-limiting and medical intervention is usually unnecessary. Rarely, where conservative measures fail to relieve symptoms, invasive intervention may be required.

We report the case of a child with suspected PDPH after multiple LPs, treated successfully using EBP.

Case Report
An 8-year-old boy (114 cm, 17.3 kg) with autism and global developmental delay underwent LP using a Whitacre spinal needle (22 G) for cerebrospinal fluid (CSF) analysis to rule out glucose transporter type 1 deficiency syndrome; multiple attempts were required for successful sampling. He was discharged uneventfully. Two days later, he was presented to the ER room complaining of a headache, non-projectile vomiting, and lethargy. Conservative management failed, and an epidural blood patch was performed. An epidural catheter was left in situ, in case a second patch was required. The child recovered fully without complications.

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His symptoms persisted for 2 days; therefore, the anesthesia team got involved and a decision was made to apply EBP after measuring the epidural space depth (18 mm) using the MRI image. EBP was conducted under general anesthesia (GA) in the lateral position, with the lumbar area and right cubital fossa prepared and draped. A 19 G pediatric Tuohy needle was inserted one level below the LP needle puncture mark (L4-5) under strict sterile conditions, and the loss-of-resistance technique was used to confirm the epidural space, which was encountered at a depth of 18 mm, as determined by MRI. A few drops of clear fluid were observed. Fresh blood was extracted from the right cubital fossa. After negative aspiration, 6 mL (0.34 mL/kg) of freshly extracted blood was injected through the Tuohy needle into the epidural space. Later, an epidural catheter was inserted at a depth of 3.5 cm from the skin, to decrease the possibility of the catheter protruding into the intrathecal space. The patient was extubated and shifted to PICU. His symptoms improved dramatically 18 h after the procedure; he could sit, stand, and walk without pain, and arch his neck and back freely.

A second EBP was not needed; therefore, the epidural catheter was removed, and the patient was discharged home the following day.

Discussion

To our knowledge, this is the first case report describing PDPH treatment by threading of a catheter into the epidural space and its retention in situ after EBP. This technique was intended to overcome the controversy regarding EBP volume. In adults, the blood infusion volume range is 15–20 mL or until backpressure is felt; however, there is lack of consensus on appropriate blood volume for children because of lack of feedback under GA or sedation. Kokki et al. found that ≥0.25 mL/kg was optimal, with no correlation between the volume of blood injected and symptom resolution while Yolnen et al. suggested 0.2–0.3 mL/kg is optimal.[2] On the contrary, Hayest et al. for a case of a 4-year-old girl with PDPH, collected around 10 mL blood and administered only 7 mL (0.41 mL/kg), due to resistance during injection; the patient subsequently underwent another EBP for persistent headache, where 13 mL was injected slowly, without resistance.[3] Thus, the subjectivity of gauging backpressure sensation vary among operators and, for sedated or anesthetized patients, administration of excessive volumes, despite resistance, may result in complications. Our approach, using GA, facilitates blood sampling under sterile conditions and avoids the need for repeated punctures, since the patient is immobile. It also provides the option of administering a follow-up volume, in cases where symptoms persist for 48 h.

In a review of 41 pediatric patients, Kokki et al. described associated symptom as primarily severe headache of the whole head, along with orthostatic headache, nuchal rigidity, horizontal diplopia, facial weakness, vestibule-cochlear nerve abnormalities, radicular findings, cerebellar ataxia, encephalopathy, seizures, and coma occurring in some cases.[4] The onset of PDPH ranges from 12 to 24 h, and associated symptoms are most often nausea and/or vomiting. The difficulty in diagnosis is not only limited to lack of diagnostic awareness, variations in the needle gauge used for LP, or problems with communication with pediatric patients in general, and specifically with the subset with intellectual limitations who need LP more frequently but the presentation of photophobia and neck rigidity in the pediatric population can easily lead toward misdiagnosis with meningitis, which may contribute to the underreporting of PDPH in the pediatric population. While our patient initially presented after 48 h, with symptoms consistent with PDPH, his condition worsened and progressed a day later, despite conservative treatment.
MRI is valuable for the diagnosis of intracranial hypotension and assessment of epidural space depth and distance to the dura. MRI findings of extensive CSF leak may indicate the extent and site of CSF leak, as well as the presence of pseudomeningocele.\footnote{\textsuperscript{5}} CSF leak into the epidural space penetrates surrounding fat tissue, which is abundant in this region. Hence, high backflow of CSF into the intrathecal space differs from that into the epidural space. Application of CT-guided EBP was reported by Cornman-Homonoff et al., using the loss-of-resistance technique. Interestingly, intravenous contrast was added to the injected blood; however, there are valid concerns regarding the radiation exposure associated with this approach, particularly in pediatric patients.

While managing PDPH in pediatric patients will remain a challenging process, we believe the insertion of the epidural catheter could help overcome the difficulty of assessing young children; however, further study is required.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**
There are no conflicts of interest.

**References**

1. Headache Classification Subcommittee of the International Headache Society. The International classification of headache disorders: 2nd edition. Cephalalgia 2004; 24(Suppl 1):23-136.
2. Ylonen P, Kokki H. Management of postdural puncture headache with epidural blood patch in children. Paediatr Anaesth 2002;12:526-9.
3. Borges BC, Wong G, Isaac L, Hayes J. Unusual presentation of postdural puncture headache requiring repeat epidural blood patch in a 4-year-old child. Paediatr Anaesth 2014;24:541-3.
4. Kokki M, Sjovall S, Kokki H. Epidural blood patches are effective for postdural puncture headache in pediatrics a 10-year experience. Paediatr Anaesth 2012;22:1205-10.
5. Cornman-Homonoff J, Schweitzer A, Levi Chazen J. CT-guided epidural blood patch for treatment of CSF leak and pseudomeningocele following tethered cord release in a 3-year-old. Clin Imaging 201640:1191-4.