A Safe Method for Performing an Epidural Blood Patch in a Pediatric Patient Requiring Deep Sedation for Epidural Catheter Placement: A Case Report

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A 17-year-old boy developed postdural puncture headache after several lumbar punctures (LPs) for intrathecal chemotherapy. The pediatric anesthesiology service was consulted for an epidural blood patch (EBP). Sedation was required for the LPs, which made performing an EBP problematic because of the need for the patient to be conscious and able to report symptoms during injection of blood. An epidural catheter was placed after the next LP while the patient was sedated. After he woke up, blood was injected through the catheter and the headache resolved. This technique can be used in pediatric patients requiring deep sedation for an EBP. (A&A Practice. 2019;13:356–7.)

GLOSSARY

EBP = epidural blood patch; **LP** = lumbar puncture; **PDPH** = postdural puncture headache

An epidural blood patch (EBP) can be used to treat a postdural puncture headache (PDPH) when conservative management has failed.[1,2] Pediatric patients with certain types of cancer undergo frequent lumbar puncture (LP) procedures for intrathecal chemotherapy and are at risk of developing PDPH. In this report, we describe a technique that can be used to perform an EBP in pediatric patients who require deep sedation for invasive procedures. Written Health Insurance Portability and Accountability Act authorization was obtained from both the patient and parent.

DESCRIPTION OF THE CASE

A 17-year-old boy presented with persistent cough and worsening shortness of breath. His symptoms were caused by a large anterior mediastinal mass that was confirmed by biopsy to be T-lymphoblastic lymphoma. His medical history was significant for attention-deficit hyperactivity disorder, anxiety, and morbid obesity. His weight was 127 kg, and he had a body mass index of 45. Over the next 2 months, his therapeutic plan included a number of diagnostic LPs and several doses of intrathecal methotrexate. The hematology–oncology team performed the LPs using 5-inch, 22-gauge cutting bevel spinal needles and topical local anesthetic cream. The LPs were performed with significant difficulty, which increased the patient's anxiety to the point that deep sedation, bordering on general anesthesia, was required for subsequent LPs.

After several LPs, the patient complained of diffuse headache with nausea that worsened in the upright position. Treatment with nonsteroidal anti-inflammatory drugs and diphenhydramine provided initial relief, but his headaches worsened. The neurology service recommended conservative management with sumatriptan, magnesium, riboflavin, appropriate sleep hygiene, and adequate intravenous and oral hydration. When these conservative measures failed, the pediatric anesthesiology service was consulted for an EBP. After the consultation, it was decided that his symptoms were consistent with a PDPH and that an EBP could provide relief. Given that the next sedated LP procedure was scheduled for 36 hours later, the decision was made to perform the EBP at that time, thereby avoiding the need for 2 separate anesthetics and protecting the EBP from damage by a spinal needle that could precipitate another PDPH. The plan was that the oncologists would perform the LP, the anesthesia team would place an epidural catheter while the patient was still sedated, and the blood would be injected through the epidural catheter when he regained consciousness in the recovery room. Case reports of performing an EBP through the epidural catheter in obstetric patients with PDPH suggested that a similar technique would work in our patient.[3–5] The hematology–oncology service was unaware of any contraindications to performing a blood patch in such close proximity to intrathecal chemotherapy, anatomically, or temporally, and no such reports were found in the anesthesia literature.

After the LP was completed, the patient was reprepared for placement of the epidural catheter. A 17-gauge, 10-cm Tuohy needle was placed at a level below the lowest LP puncture site and advanced until loss of resistance was detected at 7 cm. A 19-gauge, single-orifice epidural catheter was placed at a depth of 9 cm from the skin, secured, and dressed. The patient was taken to the recovery room and allowed to recover from anesthesia. Once awake, he was positioned sitting up, and 20 mL of blood was withdrawn from his port using sterile technique. The blood was slowly injected into the epidural catheter until the patient noted

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tightness in his back and paresthesia in his legs (13 mL of blood). After injection of the blood, the epidural catheter was removed, and the patient was instructed to remain supine for 2 hours. Thereafter, the patient experienced marked improvement in his headache and diminished paresthesia in his legs. The next day, he reported no postural headache and complete resolution of the paresthesia. The patient was discharged home the following day.

DISCUSSION

PDPH is a well-known complication of diagnostic and therapeutic LP. The risk of PDPH after LP reportedly varies between 1% and 33% in adults and between 2% and 15% in children.[2] This risk is reportedly increased by use of needles with a larger gauge, cutting needles, the bevel positioned perpendicular to the dura fibers when using a cutting needle, removal of the needle without a stylet, multiple attempts, and removal of a large amount of cerebrospinal fluid.[2] The headache normally presents in the first few days after the procedure, is described as bilateral, dull, nonthrobbing, frontal or occipital with occasional radiation to the neck, forehead, or eyes, and increases in intensity when the patient is upright. Conservative therapies, including increased hydration, caffeine, sumatriptan, corticosteroids, topical sphenopalatine ganglion block, and pain control with nonsteroidal anti-inflammatory drugs and/or mild opioids are used as first-line treatments.[6] When these measures fail to resolve the headache, the treatment of choice is an EBP.

The mechanism of action of an EBP is not entirely clear but likely involves a combination of increasing the pressure in the intrathecal space, which relieves the tension on the meninges, and plugging the hole in the dura, thereby preventing further leak of cerebrospinal fluid. A 93% success rate with the first blood patch was reported in 42 adolescent patients who received an EBP for PDPH and a 100% success rate with the second blood patch.[7]

In conscious adult patients, the recommendation is to inject blood until a maximum volume of 20 mL is reached or the patient starts to complain of localized tightness in the back or paresthesia in the legs.[1] This type of feedback is often difficult to elicit in pediatric patients because of either procedural sedation requirements or young age. Therefore, in sedated pediatric patients, it is recommended that the injection be administered at a dose of 0.2–0.3 mL/kg and stopped if the clinician perceives an increase in resistance before reaching the recommended injectate volume of up to 20 mL.[7,8] The perception of increased resistance to injection is subjective and can result in overinjection, which may cause spinal cord or nerve root ischemia. Consequently, most anesthesiologists prefer to perform the EBP when the patient is awake and can verbally communicate any untoward symptoms. Our patient was a good example of the variability in tolerated injectate volume. Even if an ideal body weight of 70 kg was used for calculation, the predicted volume would have been 14–20 mL; however, the patient became symptomatic after 13 mL.

In summary, we have encountered an adolescent patient who required deep sedation for an EBP. We preferred that the patient be awake for injection of blood into the epidural space; therefore, we placed the epidural catheter while he was deeply sedated and then injected the blood through the epidural catheter when he was awake. Considering that the patient developed symptoms before the predicted volume of injected epidural blood was reached, we feel that our decision to use this technique was justified.

DISCLOSURES

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Contribution: This author helped write the manuscript and approve the final version submitted for publication.
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