Interv Pain Med Neuromod. 2022 December; 2(1):e127073. doi: 10.5812/ipmn-127073.

Published online 2022 June 1. **Case Report**

Intravenous Adrenocorticotropic Hormone in the Treatment of Post-Dural Puncture Headache: A Case of Refractory to Multiple Epidural Patch

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Received 2022 April 18; **Revised** 2022 May 02; **Accepted** 2022 May 05.

Abstract

Post-dural puncture headache (PDPH) is an iatrogenic complication. It can disturb daily activities and particularly breastfeeding after delivery. Epidural blood patch (EBP) is still a last resort and treatment of choice after administration of certain proposed drugs. The use of intravenous (IV) adrenocorticotropic hormone (ACTH) has been suggested for treatment even in refractory cases in a literature review. EBP is an invasive procedure and not desirable for most patients. The associated case report highlights the important role of ACTH in alleviating PDPH and its priority for administration prior to EBP. We hope this report prompts the anesthesiology community to provide a more evidence-based approach to the role of ACTH in the better management of PDPH.

Keywords: Multiple Epidural Patch, Headache, Adrenocorticotropic Hormone

1. Introduction

Post-dural puncture headache (PDPH) is an iatrogenic complication. It can occur following spinal anesthesia, or more commonly, inadvertent dural puncture can occur during attempted epidural anesthesia. The headache usually worsens in an upright position and is better with lying flat (1). This specific headache is associated with at least one of the following symptoms (the diagnosis of PDPH should be of note): neck stiffness, tinnitus, photophobia, and nausea (2). The precise etiology of headache after a dural puncture is unclear, but it is thought to attribute to leakage of cerebrospinal fluid (CSF) through the dural hole created by the needle. Unintentional dural puncture (UDP) occurs between 1% and 6% of epidural placements, with 11% to 33% of UDP going unrecognized until the patient presents with PDPH (3). Epidural blood patch (EBP) is the treatment of choice for PDPH (1, 2), but it is an invasive procedure, and most of the time, patients are reluctant to undergo and tolerate it. To our knowledge, there are conflicting studies regarding the efficacy of adrenocorticotropic hormone (ACTH) and its analog, such as cosyntropin, to relieve PDPH. The associated case report enhances the role of ACTH in managing PDPH. As there is no clinical trial to compare the efficacy of ACTH with EBP, the aim of this case report was to prompt researchers to conduct a well-designed clinical trial to determine which one works better for patients with PDPH.

2. Case Presentation

A 32-year-old female underwent a cesarean for the second time under epidural anesthesia in December 2020 in Pars Hospital, Tehran, Iran. In her past medical history, she had no previous surgery, anesthesia, or any specific medical problem. Epidural anesthesia was attempted preoperatively with a 17-gauge Tuohy needle. The needle was inserted at the L3-L4 interspace via the midline approach. The epidural space was located using the loss of resistance to saline technique. Although the procedure was performed by an experienced anesthesiologist, due to spinal deformity and anatomical landmark, the time it took to find the space was a little more than in normal cases. A dural punc-

ture occurred while the needle was moving forward by an anesthesiologist, and a CSF leak was noted. Then, the needle was withdrawn immediately and reattempted at the L4-L5 interspace. At this interspace, the epidural space was found earlier, and the epidural catheter was inserted easily and gently. For this patient, 60 mg lidocaine 2%, 100 μg fentanyl, and 2 mEq sodium bicarbonate 7.5% were injected into the epidural catheter. After 15 minutes, the sensation of the skin were checked by the surgeon, and the cesarean concluded 1 hour later. The patient did not complain of pain or discomfort during surgery and recovery. The neonate was male with an Apgar score of 9 at the end of the first minute.

Upon dural puncture, the pregnant patient expressed a transient headache, and until 12 hours after dural puncture, she never experienced a headache. However, after 12 hours of dural puncture, the patient began to complain of moderate headache associated with severe pain and rigidity of the neck. Bed rest, intravenous (IV) crystalloid, and limited IV caffeine (because of breastfeeding) were administrated without any significant improvement. Movement of the head and walking became impossible for the patient, and breastfeeding was not possible for her. Hence, we decided to perform an EBP with 25 mL of autologous blood at the L3-L4 interspace under sterile conditions. Immediately after the injection, the headache disappeared. Other symptoms such as neck stiffness and inability to neck movement improved gradually within 3 - 5 hours. The patient remained supine for 6 - 8 hours after EBP and was then discharged home. She was recommended to call us in case of any problem. On the second postoperative day, the patient called us regarding the recurrence of severe headache associated with neck stiffness, vertigo, tinnitus, photophobia, and diplopia. She could not breastfeed, and her daily activities were fully disturbed. She was readmitted to the hospital, and IV fluids and IV caffeine were administered, along with complete bed rest in the hospital. Her symptoms were not relieved while hospitalization and continued until the next day. On the third postoperative day, another EBP was performed at the L4-L5 interspace, and thereafter the patient remained supine for 6 hours. The patient‘s symptoms improved with good relief from her headache. She was discharged home on the third postoperative day.

The patient returned to the hospital on the fourth postoperative day with a front-occipital headache, neck stiffness, tinnitus, and blurred vision, except that it was more severe in intensity. She denied any fever, back pain, numbness, weakness, or urinary complaints. Physical and neurological examinations remained unchanged and normal. The patient was admitted to the emergency department. Neurological and infection consultation, along with magnetic resonance imaging (MRI) of the head, neck, and thoracolumbar spine, was performed to rule out other differential diagnoses. Finally, all neurologic and infectious diseases were ruled out, and the neurologist concurred with the diagnosis of PDPH. The conventional therapy with IV crystalloid, IV caffeine infusion, oral nonsteroidal anti-inflammatory drug (NSAIDs), and EBP (2 times) were all fully failed. The patient was reluctant to have another EBP. Accordingly, based on the preexisting reports indicating the use of ACTH in the treatment of patients with PDPH, we decided to try the treatment with cosyntropin (a synthetic analog of ACTH) (3-6). For this purpose, 1 mg of cosyntropin was administered IV over 20 minutes in 500 mL normal saline 0.9%. After 6 hours, she had 90% relief of her headache (pain score decreased from 10 to 2). The same dose was repeated after 12 hours of the first dose with complete resolution of her symptoms. The patient was discharged after 24 hours of symptoms resolution on the fifth day postoperatively. We contacted her by telephone after 5 and 10 days of discharge to ask her about remission of symptoms, but she expressed her satisfaction with no symptoms over the last 10 days, and the patient‘s symptoms resolved forever.

It is of note that the consent form was signed by the patient, and she permitted us to report her problems and treatments completely.

3. Discussion

ACTH or its synthetic analogs for the treatment of PDPH have been reported since 1994 (3-6). The efficacy of ACTH in improving the refractory cases of PDPH, which are unresponsive to EBP has been reported (7). Two randomized trials have been reported thus far. One of them confirmed the efficacy of cosyntropin, and the other rejected it (4, 5). It is worth mentioning that in the latter study, intramuscular cosyntropin was used for patients, which may justify the lack of efficacy of cosyntropin in relieving the headache. Different analogs, doses, and routes of administration of ACTH have been reported for the treatment of PDPH. In the most recent clinical trial, cosyntropin has been demonstrated to have the same efficacy of EBP immediately on days 3 and 7 after treatment (4). One of the trials used 1 mg of cosyntropin for the prophylaxis of PDPH after accidental dural puncture (5). In their study, the need for an EBP was reduced from 30 to 11%, and the incidence of PDPH was 50% lower than that reported in the literature. The proposed mechanisms include increased CSF production via sodium channels; aldosterone mediated salt, water retention, and possibly increased B endorphin output (4, 6). Compared to the other suggested drugs (such as gabapentin, hydrocortisone, sumatriptan, and theophylline), cosyntropin re-

mains a valid and safe treatment option for PDPH (6). Our case report highlights and enhances the important role of ACTH in the treatment of PDPH. Although EBP is known as an effective treatment for PDPH, an infusion of 1 mg of cosyntropin over 20 minutes can be used to administer before performing an invasive procedure of EBP, which is less desirable for both patients and anesthesiologists. This finding warrants conducting several double-blinded clinical trials to compare ACTH with EBP to establish a well-designed management for PDPH and suggest the optimal approach to this iatrogenic complication.

Footnotes

Authors' Contribution: Study concept and design: A. S; analysis and interpretation of data: R. A; drafting of the manuscript: M. P. and A.S; critical revision of the manuscript for important intellectual content: A. T. and M. M.

Conflict of Interests: There is no fund and conflict of interest for the authors of this case report. It is a self-funded study by authors.

Funding/Support: There was no fund for this study.

Informed Consent: The consent form was signed by the patient, and she permitted us to report her problems and treatments completely.

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