Neostigmine and atropine as a treatment for Postdural Puncture Headache after spinal anesthesia in cesarean section: A Case Report

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INTRODUCTION

An unpleasant experience for both the patient and the anesthetist, post-dural puncture headache (PDPH) is a complication of spinal anesthesia or lumbar puncture. It is believed to be caused by cerebral vasodilation, which is an indirect consequence of low cerebrospinal fluid (CSF) pressure, or meningeal traction linked to low CSF pressure.[1] PDPH incidence varies, although it is generally thought to be 36% or more after lumbar puncture, 0%-10% after spinal anesthesia, and 81% after an unintentional dural puncture during epidural insertion.[2, 3] Although PDPH typically resolves on its own, it can make it difficult for mothers to care for their infants and lengthen hospital stays. Serious side effects such as subdural hematoma, convulsions, sagittal sinus thrombosis, and cranial nerve palsies are more infrequently linked to PDPH.

CASE PRESENTATION

We report a case of a 31-year-old female who had a cesarean section under spinal anesthesia with a history of gestational hypertension and presented with severe positional headache, blurring of vision on the 5^{th} postoperative day (POD) to a local hospital where she had done her cesarean section. The headache was postural, mainly in the front-occipital area, and worsened with upright posture. Conservative management for headache was done in primary hospital but couldn't subside. So, she was referred to our hospital.

On the 7^{th} POD, she was admitted to our hospital with a worsening headache despite conservative and Non-steroidal anti-inflammatory drug (NSAID) treatment. During the presentation, she had difficulty speaking, and diplopia, and her Glasgow Coma Scale (GCS) was E4V5M6.

On the 8^{th} POD, the headache was persistent with self-reporting NRS score of 7/10 even though she was on intravenous fluids, NSAIDs, and opioids. A Sphenopalatine ganglion block was tried but that helped only for a few minutes. The patient was planned for epidural blood patch but refused to have the procedure because of her bad prior experience with spinal anesthesia.

As an alternative to EBP, on the next day, intravenous neostigmine (20 mcg/kg) along with atropine (10 mcg/kg) was given over a period of 10 minutes. After 30 minutes of injection, her pain scoring (NRS) was 1/10, and she did not require any forms of pain medication for 24 hours.

DISCUSSION

A thorough history and physical examination, as well as the clinical presentation (with documented Dural puncture and acute postural headache being the most distinctive features), are used to make the diagnosis of PDPH. An intracranial pathology such as an intracranial subdural hematoma and posterior reversible encephalopathy syndrome are included in the differential diagnosis of PDPH in an obstetric patient, along

with caffeine withdrawal, headaches, meningitis, sinus-related conditions, preeclampsia, pneumocephalus, and meningitis.[4]

The International Headache Society (IHS) defines PDPH as a headache occurring within 5 days of a lumbar puncture, caused by cerebrospinal fluid (CSF) leakage through the dural puncture. It is usually accompanied by neck stiffness and/or subjective hearing symptoms within two weeks; the PDPH typically goes away on its own or after the leak has been sealed with an autologous epidural lumbar patch.[5]

Treatment options can be divided into conservative, pharmacological, and epidural blood patch (EBP). Conservative management has traditionally involved bed rest and fluids, though there is little evidence to support either of these measures.

Numerous other reports exist in the literature with promising results for a variety of other pharmacological agents, including 5HT agonists (e.g., Sumatriptan), gabapentin, DDAVP, theophylline, and hydrocortisone. To date, there is insufficient evidence to support their use. A recent Cochrane review has concluded that therapeutic EBP is beneficial compared with conservative treatment for PDPH.[6] Even though it is considered the gold standard of treatment, but the success rate is 50%, and the need for a second EBP may be 40%.[7] Early complications include backache during injection, fever, bradycardia, and seizures. Late complications include meningitis, subdural hematoma, arachnoiditis, and radicular pain.[8] In this case, we have tried pharmacological means such as Neostigmine (20 mcg/kg) and atropine (10 mcg/kg) after conservative management failed.[9] The numeric Rating Scale was 1/10 after 30 minutes of injection. She did not require any pain medications after a single dose of neostigmine and atropine. A single dose of neostigmine and atropine was enough, although this can be given every 8 hours if the headache has not subsided.

Systemic neostigmine does not cross the blood-brain barrier. However, it can enter the CSF because the BBB and Blood –CSF barriers are anatomically distinct. Neostigmine increases the level of acetylcholine in CSF and in the brain through inhibition of cholinesterase, resulting in cerebral vasoconstriction. The central effects of both drugs influence both cerebrospinal fluid secretion and cerebral vascular tone, which are the primary pathophysiological changes in PDPH (figure.1).[10, 13]

As described by Ahmed et al in a randomized controlled trial of involving 85 patients, use of neostigmine/atropine for PDPD treatment when compared with conservative treatment of hydration and analgesic had significantly better outcome. However side effects such as abdominal cramps, muscle twitches and urinary bladder hyperactivity occurred in the treatment group. Although the study was designed to administer the interventional drug eight hourly for a duration of 72 hours, the authors report not needing more than 2 subsequent dosages of the treatment drug for symptomatic relief. In our case, a single dose was sufficient to achieve excellent symptomatic relief with no reported side effects.[14]

CONCLUSION

In the context of severe headache not subsiding with conservative management and intensity of headache persistently worsening, one must have a neurologic examination followed by neuroimaging for timely diagnosis and treatment. Neostigmine/atropine is a choice drug for the management of severe headaches in post-dural puncture headaches after spinal anesthesia. Neostigmine/atropine was effective in treating PDPH after only a single dose. Although lacking robust evidence, use of a novel and non-invasive treatment when compared to an invasive procedure like an epidural blood patch certainly warrants more attention and future research.

ABBREVIATIONS

PDPH Post Dural puncture headache

EBP Epidural blood patch

CSF Cerebrospinal fluid

GCS Glasgow Coma Scale

NRS Numerical Rating Scale

VC Vasoconstriction

VD Vasodilation

BL-CSF Blood cerebrospinal fluid barrier

CSG Cervical sympathetic ganglia

AUTHOR CONTRIBUTIONS

Indra Kumar Shrestha: Conceptualization; data curation; methodology; writing - original draft; writing – review and editing.**Rupak Chalise:** Data curation; methodology; writing – original draft; writing – review and editing**. Saroj Poudel:** Data curation; methodology; writing - original draft; writing – review and editing. **Ashim Regmi:** Supervision; writing – original draft; writing – review and editing. **Anup Ghimire:** Supervision; writing – review and editing. **Bikash Khadka:** Supervision; writing – review and editing. **Kishor Khanal:**Supervision; writing – review and editing.

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CONFLICTS OF INTEREST STATEMENT

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

ETHICAL CONSIDERATIONS

This case report did not require the approval of any Ethical Committee.

INFORMED CONSENT

Written informed consent was taken from the patient.

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