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Cerebrospinal fluid removal during spinal anaesthesia for caesarean delivery in a patient with idiopathic intracranial hypertension

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Dear Editor,

Idiopathic intracranial hypertension (IIH), also known as pseudotumour cerebri or benign intracranial hypertension, is a neurologic condition that commonly affects obese females of child-bearing age [1]. IIH occurs when cerebrospinal fluid (CSF) accumulates abnormally in the brain, leading to elevated intracranial pressure (ICP) and symptoms such as headache, papilloedema, and vision changes. This accumulation of fluid may be due to an increase in fluid production or a decrease in fluid absorption. It is characterised by an increased ICP without signs of altered mental status, absence of intracranial lesions, and normal CSF composition [2, 3]. The incidence of IIH is greatest in obese females of child-bearing age, with an estimated incidence of 7.9/100 000 [1].

Treatment strategies focus on redirecting or removing CSF from the subarachnoid space or decreasing the production of CSF [4]. Serial lumbar punctures may also be used to remove 20–30 mL of CSF with moderate success rates [5]. Acetazolamide is also often employed as it decreases CSF production, though the long term use of this medication is associated with acidaemia and is often discontinued in pregnancy [5]. Surgical interventions for refractory symptoms may be considered at later stages.

We present a patient with IIH who was admitted for worsening headache with vision changes and later required a caesarean delivery. She achieved symptomatic relief of IIH with low volume CSF removal during spinal anaesthesia.

A 30 year-old primigravida at 39 weeks gestation with a body mass index of 40 kg m^{-2} presented to labour and delivery with regular contractions and breech presentation. She had a diagnosis of IIH for several years, which had been previously well managed with acetazolamide and occasional CSF removal with lumbar punctures. During her pregnancy she had stopped her acetazolamide and noted worsening of her IIH symptoms. She was managed during her pregnancy with occasional therapeutic lumbar punctures for CSF removal.

Upon presentation the patient complained of a pressure like headache at 7/10 intensity along with blurry vision. She was admitted to labour and delivery and evaluated for pre-eclampsia given her complaints and symptoms. The patient was normotensive with normal laboratory values and had reported that her symptoms had been progressively getting worse throughout her pregnancy. Given that the patient was at term gestation with regular contractions in breech presentation, the decision was made to

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proceed with a primary caesarean delivery.

The patient was brought to the operating room for her delivery, which was to be performed with neuraxial anaesthesia. The patient was positioned in the sitting position and prepped in sterile fashion. The intrathecal space was located at the L3–L4 level using a 25-gauge cutting spinal needle. Before administering drugs intrathecally, 5 mL of CSF was withdrawn through the spinal needle over approximately 4 minutes. After removal of CSF, 1.6 mL of 0.75% bupivacaine, 10 µg of fentanyl and 100 µg of epinephrine were injected into the intrathecal space. The patient was then placed supine and proceeded to have an uneventful caesarean delivery. Within 10 minutes after CSF removal, the patient reported significant improvement of her headache and vision, which continued through her postpartum care until discharge on post-partum day three.

The ideal anaesthetic management of pregnant patients with IIH requiring caesarean delivery is unknown. Epidural, spinal, and combined spinal-epidural anaesthesia have all been successfully performed in patients with elevated intracranial pressure [6–9].

Spinal anaesthesia with injection of medications into the intrathecal space increases CSF volume and ICP with a potential decrease in cerebral perfusion pressure (CPP). Alternatively, epidural anaesthesia avoids injecting medication into the intrathecal space but requires larger volumes for adequate surgical anaesthesia. Animal studies suggest that these large volumes in the epidural space can also lead to an increase in ICP [10]. Combined spinal–epidural analgesia with a needle-through-needle technique allows for CSF withdrawal but risks needle dislodgement, leading to failure of spinal analgesia, epidural failure, or large-bore dural puncture.

We have demonstrated that intrathecal analgesia can be safely performed with a small spinal needle and minimal injectate volume preceded by CSF withdrawal to treat IIH symptoms. Our technique allows for CSF withdrawal before injecting volume into the intrathecal space, minimising an increase in ICP. Additionally, it avoids large volume injections into the epidural space that would be required with an epidural technique or a combined spinal–epidural. It also avoids the risk of a failed or untested epidural as well as a large-bore dural puncture. We do recognise that our technique is not without complications as well, as it does require additional time for CSF withdrawal, which may lead to inadvertent additional dural punctures as well as a possible failed spinal. This last complication can be minimised by reconfirming that the operator is in the intrathecal space before injecting the medication.

It is also worth mentioning that caution should be used before removing CSF in patients with concern for elevated ICP due to risk of brain herniation. We concluded that small CSF volume reduction would be safe and beneficial to this patient based on her past history of therapeutic CSF removals. Additionally, we did not want to further increase her ICP given her neurological symptoms. Clinicians must weigh the risks and benefits of performing CSF removal prior to neuraxial anaesthesia compared to adding volume to the neuraxial space without CSF removal, which could itself raise ICP.

To sum up, IIH is an uncommon disease process that physicians may encounter when caring for pregnant patients. We report a technique that we believe is easy to use for physicians who are skilled in neuraxial anaesthesia that can provide symptomatic relief to patients with IIH, as well as providing safe maternal anaesthesia for caesarean deliveries.

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REFERENCES

1. Radhakrishnan K, Ahlskog JE, Cross SA, Kurland LT, O'Fallon WM. Idiopathic intracranial hypertension (pseudotumor cerebri). Descriptive epidemiology in Rochester, Minn, 1976 to 1990. Arch Neurol 1993; 50: 78-80. doi: 10.1001/archneur.1993.00540010072020.
2. Friedman DI, Jacobson DM. Diagnostic criteria for idiopathic intracranial hypertension. Neurology 2002; 59: 1492-1495. doi: 10.1212/01.wnl.0000029570.69134.1b.
3. Binder DK, Horton JC, Lawton MT, McDermott MW. Idiopathic intracranial hypertension. Neurosurgery 2004; 54: 538-551. doi: 10.1227/01.neu.0000109042.87246.3c.
4. Johnston I, Paterson A, Besser M. The treatment of benign intracranial hypertension: a review of 134 cases. Surg Neurol 1981; 16: 218-224. doi.org/10.1016/0090-3019(81)90010-0.
5. Thurtell MJ, Wall M. Idiopathic intracranial hypertension (pseudotumor cerebri): recognition, treatment, and ongoing management. Curr Treat Options Neurol 2013; 15: 1-12. doi: 10.1007/s11940-012-0207-4.
6. Karmaniolou I, Petropoulos G, Theodoraki K. Management of idiopathic intracranial hypertension in parturients: anesthetic considerations. Can J Anesth 2011; 58: 650. doi: 10.1007/s12630-011-9508-4.
7. Heckathorn J, Cata JP, Barsoum S. Intrathecal anesthesia for cesarean delivery via a subarachnoid drain in a woman with benign intracranial hypertension. Int J Obstet Anesth 2010; 19: 109-111. doi: 10.1016/j.ijoa.2009.07.010.
8. Month RC, Vaida SJ. A combined spinal-epidural technique for labor analgesia and symptomatic relief in two parturients with idiopathic intracranial hypertension. Int J Obstet Anesth 2012; 21: 192-194. doi: 10.1016/j.ijoa.2011.12.003.
9. Bedard JM, Richardson MG, Wissler RN. Epidural anesthesia in a parturient with a lumboperitoneal shunt. Anesthesiology 1999; 90: 621-623. doi: 10.1097/00000542-199902000-00039.
10. Grocott HP, Mutch WAC. Epidural anesthesia and acutely increased intracranial pressure lumbar epidural space hydrodynamics in a porcine model. Anesthesiology 1996; 85: 1086-1091. doi: 10.1097/00000542-199611000-00017.