Obstetrical and Pediatric Anesthesia

Epidural dextran-40 and paramethasone injection for treatment of spontaneous intracranial hypotension

[L'injection péridurale de dextran-40 et de paraméthasone pour traiter l'hypotension intracrânienne spontanée]

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Purpose: This report describes treatment with epidural dextran-40 and paramethasone injection of postural headache resulting from spontaneous intracranial hypotension in a pregnant patient.

Clinical features: A 39-yr-old pregnant woman consulted the pain clinic for the assessment of a debilitating postural headache which was non-responsive to conventional analgesic treatment. Clinical findings and cranial magnetic resonance imaging indicated the diagnosis of spontaneous intracranial hypotension syndrome. Treatment with an epidural blood patch was not undertaken for several reasons. A lumbar epidural injection with dextran-40 and paramethasone led to a significant improvement in the symptoms and allowed a progressive discontinuation of adjuvant treatment with oral steroids, with complete resolution of symptoms.

Conclusion: We report a case of spontaneous intracranial hypotension in a pregnant patient successfully treated by epidural injection of dextran-40 and paramethasone, with adjuvant oral steroid therapy. Clinical trials are warranted to establish the efficacy of this treatment as an alternative to the epidural blood patch administration.

Objectif : Décrire le traitement de céphalées posturales, résultant d'hypotension intracrânienne, avec une injection péridurale de dextran-40 et de paraméthasone chez une femme enceinte.

Éléments cliniques : Une femme enceinte de 39 ans a consulté pour des céphalées posturales débilitantes réfractaires au traitement analgésique traditionnel. Les signes cliniques et l'examen d'imagerie par résonance magnétique ont indiqué un syndrome d'hypotension intracrânienne spontanée. Le colmatage sanguin

péridural n'a pas été entrepris pour diverses raisons. L'injection péridurale avec du dextran-40 et de la paraméthasone a significativement diminué les symptômes et a permis un abandon progressif du traitement adjuvant, avec des stéroïdes oraux, et une résolution complète des symptômes.

Conclusion : L'hypotension intracrânienne spontanée chez une patiente enceinte a été traitée avec succès par une injection péridurale de dextran-40 et de paraméthasone combinée à un traitement adjuvant de stéroïdes oraux. Des études cliniques devraient établir l'efficacité de ce traitement en remplacement de l'administration d'un colmatage sanguin péridurale.

INTRACRANIAL hypotension syndrome generally occurs following a diagnostic lumbar puncture, myelography, spinal anesthesia, cranial or spinal surgery or as a result of an overdraining cerebrospinal fluid (CSF) shunt.¹ However, this syndrome can also occur spontaneously. Spontaneous intracranial hypotension (SIH) is a postural headache syndrome caused by the rupture of congenital, sub-arachnoid (Tarlov) cysts or diverticuli, mimicking the clinical presentation of a postural puncture headache syndrome (PDPH).^{1,2} Spontaneous intracranial hypotension is characterised by postural headache, low CSF pressure, and magnetic resonance imaging (MRI) findings of diffuse pachymeningeal gadolinium enhancement.³ In contrast to PDPH, SIH may be

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FIGURE Magnetic resonance imaging scan. Axial T1-weighted image showing diffuse thickening of the dura.

associated with a diminished response to lumbar and thoracic epidural blood patch (EBP) administration, suggesting that different pathophysiological mechanisms may underlie SIH and PDPH.^{1,2} Alternative treatments should therefore be considered.

We searched the MEDLINE/Pubmed database (from January 1996 to August 2005), using different search terms (including “intracranial hypotension”, “headache” and “pregnancy”) and the terminology “intracranial hypotension” when using the MeSH database. Only one case report describes SIH in pregnancy.⁴ This case was managed conservatively, and the postural headache resolved spontaneously within a month of bed rest. In this article we describe a second case of SIH presenting during pregnancy. Conventional treatment in this patient was ineffective, and the postural headache was treated via epidural administration of dextran-40 and paramethasone. Consent for publication of this report was obtained from the patient according to our institutional guidelines.

Case report

A healthy 39-yr-old woman, gravida 2, at eight weeks gestation, consulted her obstetrician for a two-day

history of persistent severe occipital headache. The pain was associated with neck stiffness, bilateral partial hearing loss, and was aggravated by the upright position. She also described mild hypersensitivity to light, and complained of progressive nausea and vomiting. There were no localizing neurological signs. The patient was referred to a neurologist who diagnosed SIH. Her cranial MRI exam at the time demonstrated a diffuse thickening of the dura, both supra- and infratentorially (Figure).

Symptomatic treatment involving oral analgesics and bed rest was recommended. However, the symptoms continued to worsen over the following three weeks, impeding her ability to work. Initial treatment with oral dexamethasone 4 mg tid over a period of two weeks improved the headache, however the hearing loss persisted. Following cessation of corticosteroid therapy, there was an acute deterioration with worsening of the headache, which became persistent, and complicated with drowsiness. Low doses of dexamethasone were resumed (4 mg·day⁻¹) with improvement in the headache once again, although the drowsiness and deafness persisted. The patient was subsequently referred to our chronic pain unit.

At eight weeks gestation, the patient reported a history of acute lumbar back pain while doing mild exercise at home two days prior to the onset of headache. As the level of CSF leak had not been identified during the initial investigations, a lumbar epidural injection of dextran-40 and paramethasone was chosen as treatment. An 18-G Tuohy needle was inserted at the L2/L3 level, and the epidural space was identified by the air loss of resistance technique. Twenty-six millilitres of dextran-40 and 80 mg paramethasone were injected epidurally. The patient remained in the supine position for one hour following the procedure. Symptomatic relief was achieved, with immediate and complete cessation of the headache and deafness. Two days later, the patient was referred back to the clinic complaining again of headache, although this time, less intense in nature. Oral steroid intake was reduced, and the headache resolved. Within four weeks, the steroid treatment was discontinued. The patient's headache did not recur, and she subsequently delivered a healthy male child (vaginal delivery at term, with epidural analgesia during the labour). At one year follow-up, the mother remained asymptomatic, and both she and her son were observed to be in good health.

Discussion

Spontaneous intracranial hypotension is a postural headache syndrome unrelated to dural puncture. Intense headache associated with SIH may involve

the entire cranium or can be referred to occipital or frontal regions.^{1,2} Associated symptoms include nausea, vomiting, tinnitus, partial deafness, photophobia, neck stiffness (all the symptoms were manifested in our case), hyperacusis, diplopia, nystagmus, visual loss, vertigo, anorexia, and malaise.^{1,2} Auditory, ocular, and vestibular symptoms have been attributed to brain displacement with cranial nerve traction-induced palsies, traction-edema of the optic chiasm, and intralabyrinthine and changes in cochlear fluid pressure gradients.^{1,2} Headaches from SIH are more prevalent in women than men, and the average age at presentation is 43 ± 16 yr.¹ The etiology of SIH is unresolved, and there remains controversy as to whether the syndrome is caused by loss of CSF volume or CSF hypotension.⁵

Diagnosis of SIH is usually made in conjunction with cranial MRI findings of diffuse enhancement of the dura and evidence of low CSF pressure in a patient with a typical history of orthostatic headache. However, cases with normal CSF pressure or a normal cranial MRI have also been reported.⁶ In our case a lumbar puncture was not performed, and the cranial MRI demonstrated diffuse enhancement of the dura, the most commonly described imaging abnormality in SIH.⁷ The diagnosis of SIH in this patient was therefore based upon clinical symptoms and cranial MRI findings. The level of CSF leak could not be identified via computerized axial tomography with myelography or radionuclide cisternography, as the patient was pregnant. However, a spinal MRI could have been performed to determine the level of CSF leak.^{3,8}

The natural history of SIH is usually one of gradual resolution of postural symptoms over weeks or months during conservative management, consisting of bed rest and generous oral fluid intake. Adjuvant treatment options include oral analgesics, use of an abdominal binder, oral caffeine, and corticosteroids.^{1,2} As conservative medical management was ineffective in our patient, we considered an EBP, which has been used in non-responsive cases,^{1,2,9–12} even when the site of CSF leak has not been identified.^{1,2} However, epidural injection of dextran-40 (20–30 mL) has been shown to be effective in managing PDPH complications arising from spinal or epidural anesthesia for surgical and obstetrical indications.¹³ We have long-term experience in our hospital using epidural dextran-40 as a treatment for PDPH.¹⁴ Theoretically, injection of a colloidal agent increases the epidural pressure and immediately relieves headaches.¹³ Due to its high viscosity, reabsorption of the colloid from the epidural space may be delayed, enabling closure of the dural hole.¹³ Except for rare dysesthesia at the

site of injection (10%), no serious complications have been reported either during or following the epidural administration of dextran-40.¹³

Dextran-40 is the primary epidural therapy for PDPH in our hospital. The success rate of EBPs in patients with SIH may be lower than in patients with PDPH. In view of an uncertain success rate and potential neurological complications associated with EBP for patients with SIH,¹⁰ we decided to administer an epidural dextran-40 patch as first-line treatment. Although no serious complications have been reported using epidural dextran-40, the world-wide experience with this method is low.

Oral steroids are considered as adjuvant therapy for SIH. In our case, dexamethasone helped to moderate symptoms. Intravenous hydrocortisone has also been used in the treatment of PDPH. Based on the effectiveness of systemic administration of steroid in SIH and PDPH, we empirically added 80 mg of paramethasone to the epidural injection of dextran-40, and the oral steroid dose was gradually tapered over the ensuing four weeks. There is no reported experience of managing SIH adjuvant epidural steroid injection.

In conclusion, we report a case of SIH in a pregnant patient successfully treated by epidural injection of dextran-40 and paramethasone, with adjuvant oral steroid therapy. Clinical trials are warranted to establish the efficacy of this treatment as an alternative to the EBP administration.

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