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Lower extremity radicular pain after prophylactic intrathecal saline injection through a subarachnoid catheter following accidental dural puncture

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ABSTRACT

We describe a case in which severe lower extremity radicular pain occurred after administration of 0.9% saline into the subarachnoid space through a catheter that had been left for 20 h following inadvertent dural puncture in an obstetric patient. A 42-year-old (G8P7) woman was admitted for repeat cesarean delivery. Accidental dural puncture occurred during epidural placement. Following a slow 10-mL intrathecal injection of 0.9% normal saline an epidural catheter was advanced into the subarachnoid space. Spinal anesthesia was used for cesarean delivery and the subarachnoid catheter was kept in place for 20 h. Before catheter removal, an additional 10 mL of 0.9% saline was slowly administered into the intrathecal space. Almost instantly, the patient complained of back pain that progressed to lower extremity radicular pain and paresthesia; symptoms began to resolve after 10 min. Subsequently, the patient developed a postdural puncture headache that persisted for three days. The patient's radiculitis and paresthesia likely resulted from an acute increase in intrathecal pressure after saline administration or from direct catheter irritation. Although both intrathecal saline administration and subarachnoid catheter placement have been previously proposed as ways to prevent postdural puncture headache, their efficacy remains controversial, and we advise caution with these techniques. © 2011 Elsevier Ltd. All rights reserved.

Keywords: Dural puncture; Epidural; Intrathecal catheter; Intrathecal saline; Postdural puncture headache; Paresthesia; Radicular pain

Introduction

Postdural puncture headache (PDPH) is not uncommon in the parturient, given the obstetric population's gender, young age, and widespread use of neuraxial anesthesia.¹ Proposed strategies to prevent PDPH after accidental dural puncture (ADP) include injecting the

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withdrawn cerebrospinal fluid (CSF) back into the subarachnoid space, passing an epidural catheter through the dural hole, injecting saline into the subarachnoid space through the intrathecal catheter, administering continuous labor analgesia through the intrathecal catheter, and leaving the catheter in situ for 12–20 h.² These techniques remain controversial and are not well supported in the literature.³ We describe a case in which severe lower extremity radicular pain occurred after 0.9% saline was injected into the subarachnoid space before removing a catheter that had remained in place for 20 h following ADP.

Case report

A 42-year-old, healthy (G8P7) Hispanic woman, at 37 weeks of gestation was admitted to the labor and delivery ward in active labor after spontaneous rupture of membranes. She was 163 cm tall and 101 kg at time of presentation (body mass index 38 kg/m²). The patient had a history of one cesarean delivery and vaginal birth after cesarean delivery (VBAC) on two subsequent occasions. Her only medications were prenatal vitamins. The patient refused a trial of VBAC, requesting a repeat cesarean delivery and bilateral tubal ligation. She was taken to the operating room and placed in the sitting position. A senior anesthesiology resident attempted to locate the epidural space with a loss-of-resistance technique using saline through an 18-gauge 8.9 cm Tuohy–Schliff epidural needle at the L3–4 interspace. An ADP occurred at 4 cm. An intrathecal injection of 0.9% saline 10 mL was slowly administered and a 20-gauge polyamide epidural catheter was threaded 4 cm into the subarachnoid space. Saline was injected through the epidural needle in an attempt to augment CSF volume and prevent further volume loss before the catheter was introduced into the intrathecal space. After confirmation of CSF aspiration through the catheter, 0.75% bupivacaine 1.2 mL with fentanyl 20 µg was injected with a resultant T4 sensory level. Vital signs remained stable throughout, and the patient's operative course was uneventful. Duromorph 0.4 mg was administered intrathecally after a healthy infant weighing 2980 g was delivered. Apgar scores were 9 and 9 at 1- and 5 min, respectively.

The subarachnoid catheter was left in place for 20 h and a second 0.9% saline 10 mL bolus was slowly injected into the intrathecal space. Before removing the catheter, the patient was headache free and otherwise asymptomatic. Within seconds of injection, the patient complained of back pain that rapidly progressed to severe pain that radiated to the anterior and lateral aspects of both legs to her knees, and posteriorly to her calf muscles. The patient became tachycardic to a rate of 150 beats/min, tachypneic with a respiratory rate well above 20 breaths/min, with a blood pressure of 152/68 mmHg, and an oxygen saturation of 100%. Physical examination revealed 5/5 motor strength in

both legs and no signs of urinary or fecal incontinence. After reassurance, the patient's heart rate, respiratory rate, and blood pressure returned to normal. Her radicular pain began to resolve after 10 min, although the patient continued to experience numbness and tingling for approximately 4 h. Because symptoms were relatively short in duration, the neurology service was not consulted and medical imaging was not ordered. Although a spinal hematoma was originally considered, the patient's quick resolution of back pain, lack of motor symptoms, and lack of incontinence made this unlikely.

However, a few hours after intrathecal catheter removal, the patient developed a bifrontal headache, which was exacerbated by upright posture, and associated with nausea. Her headache was treated conservatively with intravenous lactated Ringer's solution 1000 mL, caffeine sodium benzoate 500 mg and ketorolac 30 mg, with oral hydrocodone/acetaminophen (5 mg/500 mg) every 4 h and sumatriptan 50 mg every 12 h. An epidural blood patch was offered, but the patient declined. By postoperative day 4, the patient remained free of lower extremity radicular pain and paresthesia, and her headache had resolved. She was discharged home in a stable condition. At 6-week postpartum follow-up, the patient denied the presence of radiculitis, paresthesia, or headaches.

Discussion

Because of the potentially debilitating nature of PDPH, several measures have been proposed following ADP, such as bed rest, aggressive oral hydration, caffeine infusion, and epidural saline, although none has been shown to be consistently effective.^{4,5} The epidural blood patch is an effective treatment for PDPH,⁶ but its utility as a prophylactic measure is not supported in the literature,⁷ and exposes the patient to the risk inherent in performing another invasive procedure.

Recent strategies to prevent PDPH aim to maintain CSF volume,² although the efficacy of these techniques remain in question.³ In an adult, CSF volume is approximately 150 mL with an estimated daily production of 500 mL (0.35 mL/min).⁸ The rate of CSF loss through a dural tear has been estimated to be between 0.084 and 4.5 mL/s, which is much greater than CSF production.⁹ It is hypothesized that PDPH occurs secondary to the CSF leak lowering intrathecal pressure leading to traction on pain sensitive structures,⁸ and/or compensatory cerebral venodilatation.¹⁰ Given these hypotheses, Charsely and Abram investigated the administration of intrathecal saline either as the sole technique or in conjunction with subarachnoid catheter placement as a means to reduce the incidence of PDPH; however, the small sample size precluded meaningful statistical analysis.¹¹ A catheter placed in the intrathecal space has been postulated to act as a barrier to CSF leakage as well as inciting an inflammatory process that could help seal the

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