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Original contribution

Continuous epidural pumping of saline contributes to prevent and treat postdural puncture headache☆

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Abstract

Study Objective: Postdural puncture headache (PDPH) is the most common symptom of accidental dural puncture, a frequent complication of intraspinal anesthesia. We developed a postoperative intervention technique to prevent and treat PDPH in accidental dural puncture patients, including epidural pumping of saline. This retrospective study aimed to retrospectively evaluate this new technique for PDPH prevention and treatment.

Design: Retrospective study.

Setting: Beijing Obstetrics and Gynecology Hospital affiliated to the Capital Medical University, between January 2006 and December 2012.

Patients: Eighty-seven cases undergoing intraspinal anesthesia were assessed.

Interventions: Of these patients, 68 cases had successful repuncture and were assigned to group A (epidural filling group, n = 68), receiving continuous epidural pumping of 0.9% NS (150 mL) at a rate of 6 mL/h; the remaining cases were assigned to group B (conservative therapy group, n = 19).

Measurements: Age, height, and body weight were collected, and postoperative headache was assessed using a visual analog scale.

Main Results: Of 68 patients in group A, 49 (72.1%) developed PDPH, whereas all in group B developed PDPH ($P = .009$). In addition, all patients showed PDPH within 3 days after surgery regardless of treatment group. However, a statistically significant difference was obtained for PDPH duration between groups A and B ($P < .001$). Multivariate logistic regression analysis showed that frequency of epidural puncture and continuous epidural pumping of saline were significant risk factors for PDPH.

Conclusions: Our data indicated that application of 6 mL/h saline effectively contributes to PDPH management, and its clinical application should be broadened.

1. Introduction

Accidental dural puncture (ADP) is one of the most common complications of intraspinal anesthesia [1], occurring in 0.4% to 6.0% patients during epidural [2]. Postdural puncture headache (PDPH) is the most prevalent symptom of ADP; in

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approximately 75% to 86% patients, ADP causes PDPH, which is very severe and difficult to treat [3–6].

Risk factors for PDPH after ADP include age, sex, and previous history of PDPH. For instance, studies have shown that children younger than 13 years and elderly individuals older than 60 years are less likely to develop PDPH, whereas youngsters aged 20 to 30 years present highest risk of PDPH [7,8]. Other reports have proposed an incidence of PDPH after ADP ranging from 45% to 80% in pregnant women [1,8–12].

Routine treatment and management of PDPH are to advise patients to lie without pillow for 3 days after surgery; receive intravenous infusion of glucose saline or Ringer's solution; and take N-acetyl aminophenol, nonsteroidal anti-inflammatory drugs, opioid drugs, and other analgesics for treating headache; patients with nausea and vomiting are given symptomatic treatment with antiemetics. Other prevention and treatment methods for PDPH have been reported. In 1960, epidural blood patch (EBP) was first applied in the treatment of PDPH [13]. Although its effectiveness has been confirmed, more than 30% of patients require a second EBP [14,15]. Meanwhile, multiple studies have revealed that EBP within 24 hours of ADP is ineffective [16,17], with the optimal time 24 to 72 hours after ADP occurrence [18,19]. Common EBP complications include backache in the injection site, radiating pain in lower limbs, epidural infection, bradycardia, cranial nerve palsy, and cauda equina syndrome [14]. Application of the EBP technology varies a lot by country, and it is rarely implemented in China due to fear of relatively severe complications. Interestingly, reports describing the use of epidural infusion of saline in PDPH treatment have been published [17].

In spite of these methods, PDPH prevention and treatment remain poor, indicating the need of new options for PDPH management. Therefore, we first developed a postoperative intervention technique to prevent and treat PDPH in ADP patients between 2003 and 2005, achieving good efficacy. Our methods have been refined in the past decade, and continuous epidural pumping of saline has emerged with satisfactory results. This study aimed to retrospectively evaluate this technique in PDPH prevention and treatment.

2. Materials and methods

2.1. General information

This retrospective study assessed 87 cases undergoing intraspinal anesthesia at Beijing Obstetrics and Gynecology Hospital affiliated to the Capital Medical University, between January 2006 and December 2012. Cases with ADP were screened according to clinical data. Intraoperative management of postpuncture, age, height, body weight, surgery type, frequency of epidural puncture, licensed years of attending anesthesiologists, and postoperative headache status were recorded in details. The initial headache onset time, degree, and duration, as well as main complaints, such as nausea, vomiting, tinnitus, hearing loss, and diplopia, were recorded as well.

2.2. Anesthesia methods and management

All the 87 cases underwent combined spinal and epidural anesthesia, with L2-3 selected as puncture point routinely. Among them, ADP was found in 75 individuals during the anesthetic operation; the patients underwent another combined spinal and epidural anesthesia at L3-4, and indwelling of epidural catheter was performed. A total of 7 cases underwent general anesthesia (rapid induction intubation using remifentanil + propofol + rocuronium) due to failure of the re-epidural puncture, and 68 cases with successful repuncture received conventional subarachnoid infusion of 0.5% bupivacaine 7 to 15 mg. The 12 cases with no apparent dural puncture during the operation developed PDPH 1 to 3 days after surgery; they did not undergo epidural catheter indwelling due to absence of epidural analgesia or removal of epidural catheter.

The 68 cases with successful repuncture were assigned to group A (epidural filling group, n = 68); and the 7 cases with failed repuncture as well as the 12 individuals suffering PDPH postoperatively, to group B (conservative therapy group, n = 19). Group A patients underwent another epidural puncture in the next space after ADP. Then, a lumbar puncture needle was placed in posterior epidural space and 1.5 to 3 mL of 0.5% bupivacaine infused after seeing the cerebrospinal fluid. Afterwards, an indwelling catheter of 3 cm was placed in the epidural space. After surgery, patients received continuous epidural pumping of 0.9% NS at a rate of 6 mL/h using an electrical infusion pump. The epidural filling lasted 4 days, and epidural catheters were removed for patients with no or mild symptoms; infusion might proceed for up to 7 days for patients with severe symptoms, during which daily cleaning and disinfection of the puncture point as well as dressing were required.

All patients received postoperative analgesia, with intravenous pumping of 0.1% sufentanil at a flow rate of 2 mL/h for 24 hours. They were administered nonsteroidal anti-inflammatory drugs intravenously if they had unbearable headache and intravenous antiemetics in case of nausea and vomiting.

2.3. Observation indices

Age, height, body weight, and other patient data were collected from the electronic medical history system of the hospital. Surgery types were classified into labor analgesia, cesarean section, and gynecological operation. The frequency of epidural punctures refers to the number of attempts to implement puncture. Postoperative headache was confirmed by patients' main complaints, and its degree was assessed using a visual analog scale. Time to PDPH was defined as the number of days from surgery completion to PDPH occurrence. Nausea and vomiting, tinnitus and hearing loss, diplopia, and other symptoms were confirmed by patients' self-assessment.