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Original Contribution

Neuraxial morphine after unintentional dural puncture is not associated with reduced postdural puncture headache in obstetric patients

Molly E. Brinser, David L. Seng, DO, Gordon L. Mandell, MD, Jonathan Waters, MD, Patricia L. Dalby, MD, Grace Lim, MD, MSc*

Department of Anesthesiology, University of Pittsburgh School of Medicine, Magee-Womens Hospital of the University of Pittsburgh Medical Center, 300 Halket Street Suite 3510, Pittsburgh, PA 15213, USA

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ABSTRACT

Study objective: To examine the relationship between neuraxial morphine exposure after unintentional dural puncture and the risk for postdural puncture headache in obstetric patients.
Design: Retrospective cohort study.
Setting: Obstetrical unit at a tertiary care referral center.
Patients: Parturients receiving labor epidural analgesia with recognized unintentional dural puncture.
Interventions: Cases in which neuraxial morphine was given for any reason were compared to cases in which it was not for the outcome of postdural puncture headache.
Measurements: Development of postdural puncture headache, headache severity, number of epidural blood patches, hospital length of stay.
Main results: Of the 80 cases that were included, 38 women received neuraxial morphine and 42 did not. There was no significant difference in the incidence of headache between the two morphine groups (Headache present: Morphine: 27/56 [48.2%], No morphine: 29/56 [51.8%]; Headache free: Morphine: 11/24 [45.8%], No morphine: 13/24 [54.2%], $P = 0.84$). There was no difference in the need for epidural blood patch (Morphine: 24/42 [57.1%], No morphine: 18/38 [47.4%], $P = 0.50$) and headache severity (mean headache pain score: Morphine: 7.9 ± 1.8 vs. No morphine: 7.3 ± 2.4, $P = 0.58$). Hospital length of stay was higher in the morphine group (4.4 ± 2.9 days vs. 3.0 ± 1.5 days respectively, $P = 0.008$). Using logistic regression, morphine did not affect headache risk after controlling for covariates (morphine vs. no morphine: adjusted OR 1.24 [0.75]; $P = 0.72$; pre-eclampsia vs. no pre-eclampsia: adjusted OR 0.56 [0.41], $P = 0.42$; cesarean vs. normal spontaneous vaginal delivery: adjusted OR 0.97 [0.67]; $P = 0.96$).
Conclusion: In cases of unintentional dural puncture, exposure to neuraxial morphine for any reason may not be protective against the risk of postdural puncture headache. Although an overall protective effect of neuraxial morphine was not observed in this study, its role in specific subsets of patients remains to be investigated.

1. Introduction

The use of neuraxial analgesia and anesthesia during labor and delivery has increased over time due to both its analgesic effectiveness as well as its safety when compared to general anesthesia in the postpartum period [1,2]. However, neuraxial techniques are associated with risks, including unintentional dural puncture (UDP) [2,3]. The risk for UDP varies from 2% when performed by beginners to < 0.26% when performed by experienced specialists, for an average of about 1.5% [4,5]. Approximately 50–80% of patients who experience a UDP will develop a post-dural puncture headache (PDPH) [1,5]. PDPH can cause significant morbidity in the obstetric patient, including cranial nerve palsies, impaired childcare and breastfeeding, and it is also associated with longer hospital stays and increased healthcare costs [5,6].

Conservative measures for treatment of PDPH may include hydration, bed rest, caffeine, and oral analgesics, though many of these measures have been deemed ineffective [6]. Thus, there is a potential need for safe and effective prophylactic measures. Prophylactic epidural blood patch (EBP) has been suggested, though studies have found that this does not successfully decrease the incidence of PDPH [3,7]. Al-

* Corresponding author at: Department of Anesthesiology, University of Pittsburgh School of Medicine, Magee-Womens Hospital, 300 Halket Street, Suite 3510, Pittsburgh, PA 15213, USA.
E-mail address: limkg2@upmc.edu (G. Lim).

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Metwalli and Martlew [8,9] reported findings suggesting that prophylactic intrathecal or epidural morphine is effective in preventing PDPH in the obstetric population. Neuraxial morphine is commonly associated with nausea and vomiting (incidence 60–80%) [10], pruritus (incidence 60–100%) [11], and, in rare instances, respiratory depression (incidence 0.07%) [12]. Epidural morphine given in proximity to a dural puncture site could theoretically increase risk for translocation into the intrathecal space, thereby increasing the risk for respiratory depression. Given this wide and sometimes serious side effect profile associated with this intervention, we believe it is important to know if neuraxial morphine for cases of UDP is truly effective for reducing the risk for PDPH.

Some anesthesiologists at our institution began using neuraxial morphine for prophylaxis in some cases of UDP for PDPH; others reserved its use for conventional postoperative analgesia, when these patients required cesarean delivery. In this study, we examined the association between any exposure to neuraxial morphine after UDP and risk for development of PDPH in the obstetric population. We hypothesized that neuraxial morphine after recognized UDP is associated with a decrease in the risk for PDPH in this population.

2. Methods

This study was approved by the University of Pittsburgh Institutional Review Board (PRO14100450). The requirement for obtaining patient consent was waived for this retrospective medical record review. The records of obstetric patients who sustained a recognized UDP during initiation of labor epidural analgesia from October 1, 2013 to April 30, 2015 at our institution were identified by our department quality assurance database. Our institution is a high-risk obstetric referral center with 8000–10,000 deliveries annually, and an estimated rate of unintentional dural puncture of approximately 1%. The quality assurance database reliably captures all these cases, as recognized unintentional dural punctures are all prospectively logged and followed, and all cases of postpartum postdural puncture headaches (with or without recognized complication at the time of neuraxial placement) are also logged and followed.

After reviewing each individual record, cases were allocated to either Group M or Group C (Fig. 1). Group M consisted of patients who received neuraxial morphine through either a re-sited epidural catheter or through an intrathecal catheter that was placed after a recognized dural puncture. Group M was also sub-classified into intrathecal (IT) morphine, epidural morphine, or morphine for intrapartum cesarean delivery groups. Group C consisted of patients who did not receive any neuraxial morphine after recognized dural puncture. Attending anesthesiologists had sole discretion over which patients received epidural morphine for the purpose of PDPH prophylaxis; anesthesiologists who gave neuraxial morphine for PDPH prophylaxis, were not different with respect to training or years of experience, than those who did not give it for this purpose. The type of catheter that was ultimately used for labor analgesia (intrathecal vs. re-sited epidural) after recognized dural puncture was recorded. Other data abstracted from the medical record included maternal age, gravidity, parity, gestational age in weeks, body mass index (BMI), mode of delivery, and history of preeclampsia or headaches, development of PDPH, maximum verbal rating scale (VRS) score for headache pain, need for EBP and number of EBP if performed, and hospital length of stay. The primary outcome was defined as the development of PDPH. Secondary outcomes included number of EBP required, total hospital length of stay, and maximum headache pain severity as rated on a 0–10 verbal rating scale.

Labor epidural catheters at our institution are routinely inserted at the L3–4 or L4–5 interspace with a 17-gauge Hustead needle by a loss-of-resistance technique with saline. Initiation of epidural analgesia occurs by a bolus of 8 mL of bupivacaine 0.0825% + 2 μg/mL fentanyl and an additional 100 μg fentanyl after a negative test dose. Patient controlled epidural analgesia with continuous infusion is used with a solution of bupivacaine 0.0825% + 2 μg/mL fentanyl at 8 mL/h continuous infusion, with an 8 mL demand bolus, and a lockout of 8 min. Intrathecal catheters are typically inserted at the discretion of the attending anesthesiologist after a recognized unintentional dural puncture. Intrathecal analgesia may then be initiated by 2.5 mg isobaric bupivacaine ± 15-25 μg fentanyl. Continuous intrathecal analgesia is achieved by a basal infusion of bupivacaine 0.0825% + 2 μg/mL fentanyl at rate of 1 mL/h, with adjustments as necessary for breakthrough pain according to attending anesthesiologist judgment. Intrathecal catheters are either removed before sending the patient to the postpartum unit, or left in place for 24 h prior to removal, at the discretion of the attending anesthesiologist.

For cases of unscheduled, intrapartum cesarean delivery, epidural anesthesia via epidural in-situ is routinely achieved by 20 mL lidocaine 2% with 1:200,000 epinephrine plus epidural morphine 3–4 mg, or by 20 mL chloroprocaine 3% plus epidural morphine 3–4 mg. No intrathecal catheters for labor analgesia were associated with intrapartum cesarean delivery during this study period.

UDP is recognized by the free flow of cerebrospinal fluid through the epidural needle. The International Headache Society (IHS) defines PDPH after known UDP as a positional headache within five days after dural puncture, which is aggravated within 15 min by the upright position and relieved within 15 min by the supine position, plus at least one accompanying symptom such as nausea, photophobia, hypacusia, tinnitus, or neck stiffness [13]. While in the hospital, patients with known UDP are assessed daily by an anesthesiologist for PDPH development, and treatment options are discussed. Conservative measures that are routinely offered include oral analgesics such as non-steroidal

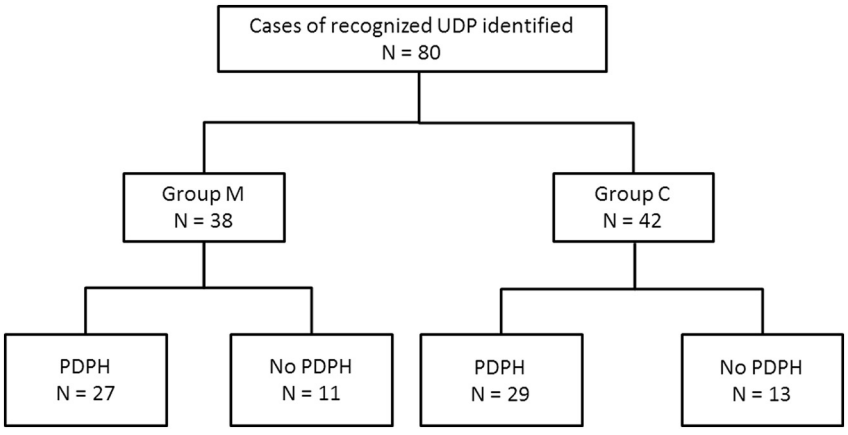

Fig. 1. Study flow diagram.