International Journal of Obstetric Anesthesia (2005) **14**, 279–283

doi:10.1016/j.ijoa.2005.02.004

ORIGINAL ARTICLE

Hypothermia after cesarean delivery and its reversal with lorazepam

P. E. Hess, C. E. Snowman, J. Wang

Department of Anesthesia and Critical Care, Beth Israel Deaconess Medical Center, Boston, MA, USA

Background: Intrathecal morphine can produce hypothermia in animals. This side effect has been reported in humans, but has not been thoroughly studied in obstetrics.
Methods: We report a series of 14 patients with presumed morphine-induced hypothermia. All patients had post-cesarean temperatures <35.8°C, and complained of associated symptoms of diaphoresis and subjective feeling of being hot. After collecting this series, we determined the incidence of this side effect in an observational study of 100 consecutive patients. All patients had spinal anesthesia with bupivacaine, morphine and fentanyl.
Results: In the case series, four of 14 patients were treated conservatively, and 10 were given lorazepam. Those treated conservatively had 6 h of hypothermia and symptoms; women given lorazepam had a cessation of symptoms and a rapid increase in temperature. In the observational study, 6% (95% Confidence Interval: 1–10%) experienced symptomatic hypothermia lasting for several hours after the end of surgery (120–360 min). We found no statistical association with any demographic or obstetric characteristic.
Conclusion: We conclude that symptomatic hypothermia is an occasional side effect of cesarean section under spinal anesthesia. We believe this syndrome is due to intrathecal morphine. While the duration is limited to 6 h, lorazepam appears to treat both hypothermia and symptoms.

Keywords: Obstetric anesthesia; Morphine; Lorazepam; Hypothermia; Cesarean delivery; Medication side effect

INTRODUCTION

Due to powerful and prolonged effectiveness, morphine is commonly administered epidurally or intrathecally for post-cesarean pain relief. The side effects of neuraxial morphine include pruritus, nausea and vomiting, urinary retention, and rarely, respiratory depression. Morphine is known to cause hypothermia in animals via a reduction in the thermoregulatory set point and peripheral vasodilation.[1–5] In cancer patients, Su et al.[6] noted that intrathecal morphine-induced hypothermia was associated with peripheral vasodilatation and sweating. Among our post-cesarean patients, we identified several similar cases in which hypothermia was associated with paradoxical diaphoresis and sensation of being hot, presumably due to vasodilatation in the skin. We became concerned that morphine-induced hypothermia may be a distinct and often unrecognized side effect in the obstetric population. Although hypothermia is common following cesarean delivery resulting from the sympathectomy of regional anesthesia, the potential contribution of neuraxial morphine to post-cesarean hypothermia has received limited attention.[7–9] We report on a series of patients who experienced what we believe to be symptomatic hypothermia due to intrathecal morphine. After collecting this series, we undertook an observational study to identify the nature and incidence of presumed morphine-induced hypothermia in the obstetric population.

METHODS

This prospective observational study was approved by Beth Israel Deaconess Medical Center institutional review board (Committee for Clinical Investigations). During both the case series and the subsequent observational study we evaluated patients who were admitted

Accepted February 2005

Funding: Beth Israel Anesthesia Foundation.

Correspondence to: Philip Hess MD, Beth Israel Deaconess Medical Center St-308 East Campus, 330 Brookline Ave, Brookline, MA 02215, United States. Tel.: +1 617 667 3112.
E-mail: phess@bidmc.harvard.edu

for elective cesarean delivery at our center, and who received regional anesthesia for surgery, consisting of bupivacaine 11.25 mg, fentanyl 25 μg and morphine 250 μg. No patient was in labor or had anesthesia or analgesia before cesarean delivery. All patients had a sublingual temperature measured at admission and again within 30 min of leaving the cesarean delivery room. A single thermometer was used for all measurements on each patient. Measurements were made every 30 min until the patient had returned to normothermia. In all cases, hypothermia was defined as a sublingual temperature 35.8°C (96.5°F) or less. Conservative therapy consisted of additional blankets, heating lamp and forced hot air warmer. Medical therapy consisted of lorazepam (0.5 to 1 mg) and was based on the decision of the individual clinician.

Case series

Data from a series of patients with hypothermia after cesarean section under spinal anesthesia were collected over a six-month period. Hypothermia was identified after cesarean delivery while in the recovery room, and was distinguished by the patient's associated symptoms, namely feeling warm or being diaphoretic. It was assumed to be due to intrathecal morphine. Patients who were treated conservatively and those who received lorazepam were compared using χ^2 with Yates' correction and Mann-Whitney tests, as appropriate. We followed the series of cases by conducting a focused observational study to estimate the frequency of this clinical side effect.

Observational study

We attempted to determine the incidence of symptomatic hypothermia, and identify associated factors, by observing 100 consecutive parturients undergoing elective cesarean delivery. The operating room temperature was set to 35°C, and all intravenous fluids were warmed to 42°C using a current-counter-current system. If the patient became hypothermic postoperatively, any associated signs or symptoms including a subjective warm or cold sensation, shivering or diaphoresis, nausea and vomiting, or pruritus were recorded. Associations between temperature and symptoms were examined using χ^2 with Yates' correction. Linear correlation examining the change in postoperative temperature measurements was performed using Pearson correlation. Logistic regression was used to identify any factors that may have contributed to symptomatic hypothermia. Data are reported as mean ± standard deviation or percentage of group, as appropriate. Differences with $P < 0.05$ are considered significant. Data were analyzed using SPSS for Windows, version 12.0, Chicago.

RESULTS

Case series

During a six-month observation period, we identified 14 patients who had developed presumed morphine-induced hypothermia. This represented 7% (14 of 193) of all elective cesarean cases that received intrathecal morphine, fentanyl and bupivacaine during that period of time. Other routine medications administered during cesarean delivery included antibiotics, ephedrine as needed, oxytocin, and lactated Ringer's solution warmed to 42°C. Surgery was unremarkable in all cases, and the surgical anesthesia regressed uneventfully within an hour of arrival to the recovery room in all patients. The mean preoperative temperature was 36.7°C (range: 36.4–37.0°C), and the mean postoperative temperature was 34.9°C (34.0–35.3°C). There were no abnormalities in vital signs or other associated medical conditions among the subjects. All patients reported feeling hot and were visibly diaphoretic, including one patient who had to have her gown changed twice during the first two hours due to saturation. Six of the 14 patients had nausea and vomiting, which responded to antiemetic medication. There were no cases of respiratory depression or sedation; however, six of the patients described dysphoria, and one of these reported feeling as if she were 'in a tunnel.'

Four of the 14 patients were treated conservatively for hypothermia. These patients had a gradual increase in temperature over 4–6 h, but remained hypothermic

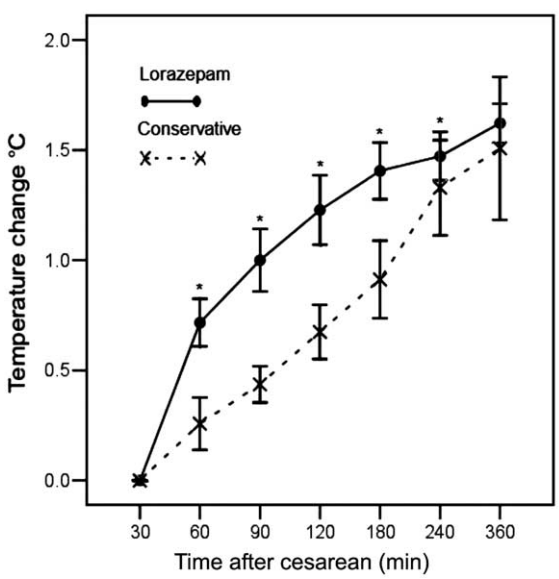

Fig. 1 Changes in temperature in case series subjects with presumed morphine-induced hypothermia. Temperature curves are displayed for subjects who received conservative treatment (n = 4) and those who received lorazepam (n = 10). Statistical significance ($P < 0.05$ denoted by $*$) for differences between 60 and 240 min using Mann Whitney test.