Does dexamethasone prevent subarachnoid meperidin-induced nausea, vomiting and pruritus after cesarean delivery?

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ABSTRACT

Background: Opioid-induced side effects such as nausea and vomiting and pruritus are common and may be more debilitating than pain itself. We performed a study to assess the efficacy of dexamethasone in reducing postoperative nausea, vomiting, and pruritus in patients receiving neuraxial anesthesia with meperidine. Methods: Fifty-two women undergoing cesarean section were enrolled in the study. The control group and dexamethasone group received intravenously normal saline and dexamethasone, respectively, before spinal anesthesia. The occurrence of postoperative nausea, vomiting, and pruritus was assessed for 24 h in both groups. Results: The overall incidence of nausea and vomiting during the 24 h follow-up period was 37% and 22.2% for group saline and 20% and 12% for group dexamethasone, respectively (P = 0.175, 0.469). The incidence of pruritus was not significantly different between the two groups. Pruritus severity was significantly less in the dexamethasone group than in the saline group (P = 0.019). Conclusion: Prophylactic dexamethasone does not reduce the incidence of subarachnoid meperidine-induced nausea, vomiting, and pruritus in women undergoing cesarean delivery.

Key words: Cesarean delivery, meperidine, nausea and vomiting, pruritus, spinal anesthesia

INTRODUCTION

Cesarean section may be performed under regional or general anesthesia; however, neuraxial blockade is the preferred mode of anesthesia because it prevents the maternal risks of general anesthesia. In recent years, intrathecal opioids have been used widely for enhanced postoperative analgesia in women undergoing cesarean delivery.[1]

Meperidine is an opioid of intermediate lipid solubility and has local anesthetic properties. It has been used as the sole agent for spinal anesthesia for caesarean section.[2] However, it provides good pain control; intrathecal meperidine also causes nausea, vomiting, and pruritus. To decrease its intrathecal side effects, many drugs have been tried, such as naloxone, dexamethasone, droperidol, and antihistamines. The treatment of opioid-induced side effects remains a challenge.[1,3-5]

Dexamethasone is a corticosteroid with strong anti-inflammatory effects, provides postoperative analgesia, and reduces postoperative nausea and vomiting in patients given intrathecal neostigmine or epidural morphine.[6] Epidural dexamethasone has also been used to reduce postoperative pain and requirement for analgesia.[7]

We evaluated the ability of intravenous dexamethasone on postoperative nausea and vomiting, analgesia and itching in women receiving spinal meperidine for cesarean section under spinal anesthesia.

METHODS

Fifty-six full-term pregnant women with class American society of anesthesiologist (ASA) I-II, scheduled for cesarean section under spinal anesthesia, were included in this prospective randomized double-blind clinical trial.
After the Ethics Committee approval, written informed consent was obtained from each patient preoperatively.

The exclusion criteria were a history of long-term steroid therapy, skin allergy, neurologic or psychological disorder, motion sickness, patients with pregnancy including hypertension or glucose intolerance, drug abuse, and patients who received opiates or antiemetic in the previous 48 h. None of the patients received any premedication. After IV line preparation, 500 cc lactated ringer solution was infused to all the patients. Patients received no premedication and upon arrival of patients into the operating room, pulse rate, peripheral oxygen saturation, and noninvasive arterial blood pressure were monitored and recorded at 5 min intervals. The patients were randomly assigned into either the control group or the dexamethasone group. The patients in the dexamethasone group received 8 mg dexamethasone with the dexadic brand name (2 cc) and those in the control group received saline 0.9% (1 cc) prior to spinal anesthesia.

Spinal anesthesia was performed at the L₅-L₁ or L₆-L₇ interspace with a 25-gauge pencil point needle using a median approach with the patient in the sitting position. After free flow of cerebrospinal fluid was confirmed, 75 mg lidocaine and 25 mg meperidine were injected intrathecally over approximately 20 Sec. After the administration of spinal anesthesia, the patients were kept in supine position with lateral lift and oxygen 3-5 L min⁻¹ was given through a facemask.

To facilitate the double-blinding method, all medications were prepared and injected by the anesthetist who was not involved in the study. Thus, the patients and the observer were blinded to groups.

The outcome measures including nausea, vomiting, pruritus, and pain were recorded in the operating room 24 h postoperatively. Nausea was defined as a subjectively unpleasant sensation associated with the awareness of the urge to vomit; vomiting was defined as rhythmic contraction of the abdominal muscles with or without expulsion of gastric contents from the mouth. Pruritus was measured on a three-point categorical scale (0=none, 1=pruritus only in a small area of the body, tolerable, 2=severe pruritus, generalized pruritus). Severe pruritus was treated with 4 mg IV ondansetron.

Postoperative pain at rest was assessed with a 10 cm visual analog scale (VAS) 0 – no pain to 10 – most severe pain) score. When the patients complained about VAS >4 and requested analgesia, intravenous morphine was given.

Continuous covariates such as age and weight were compared using the analysis of variable T-test. The duration of analgesia was analyzed by a T-test as appropriate, with the value reported at the 0.5% confidence interval. Nausea, vomiting, and pruritus were studied using a Chi-square test or the Fisher exact test. The VAS data were analyzed with the Mann–Whitney test. A value of P<0.05 was considered statistically significant. Data were expressed as mean±SD of the mean.

RESULTS

Fifty-two patients between age 18 years and 45 years, who were ASA grade 1-2, were enrolled for the study. Four patients were excluded because of the incomplete data (two women), reoperation (one woman), and inadequate anesthesia (one woman). Therefore, 52 patients completed the study, with 25 in the dexamethasone group and 27 in the control group.

The patients’ characteristics including age, weight, and duration of surgery were similar between the two groups [Table 1]. The incidence of nausea and vomiting is provided in [Table 2]. The overall incidence of pruritus was not significantly different between the two groups, whereas the severity of pruritus significantly decreased in the dexamethasone group 24 h after intrathecal meperidine injection (P=0.019). Ten patients in the dexamethasone group and seven patients in the control group had mild pruritus; six patients in the control group had severe pruritus.

There were significant differences between groups with respect to overall mean pain VAS score at rest for the first 24 h [Table 3]. The patients in the dexamethasone group received 2.32±1.79 mg morphine, whereas those in the control group received 6.30±2.12 mg morphine (P<0.001). The time to first postoperative analgesic requirement in the dexamethasone group was 550.40±418.60 min and in the control group it was 330±113.05 min; this was statistically significant. No adverse effects were observed through the 24 h postoperative period in either group.

DISCUSSION

The present results of this study indicate that dexamethasone does not significantly reduce the incidence of nausea, vomiting, and pruritus in women undergoing spinal anesthesia with intrathecal meperidine use; however, it reduces the intensity of pruritus, postoperative pain, and morphine rescue doses.

Different adjuvants such as opioids, vasoconstrictors, and corticosteroids have been added to local anesthetics to prolong the duration of spinal anesthesia, thus allowing
Table 1: Demographic characteristics of patients enrolled in study

| Parameter       | Dexamethasone N=25 | Control N=27 | P value |
|-----------------|---------------------|--------------|---------|
| Age (years)     | 28.36±4.66          | 28.3±5.53    | 0.985   |
| Weight (Kg)     | 80.52±12.64         | 79.24±15.19  | 0.744   |
| Duration of surgery (minutes) | 41.60±3.46 | 43.62±6.87 | 0.182   |

Table 2: Postoperative nausea and vomiting and pruritus

| Parameter       | Dexamethasone N=25 | Control N=27 | P value |
|-----------------|---------------------|--------------|---------|
| Pruritus        | 10 (43%)            | 13 (56.5)    | 0.554   |
| Nausea          | 5 (20%)             | 10 (37%)     | 0.175   |
| Vomiting        | 3 (12%)             | 6 (22.2%)    | 0.469   |

Table 3: Visual analogue score scale for pain at different times after surgery

| After surgery (hours) | Dexamethasone N=25 | Control N=27 | P value |
|-----------------------|--------------------|--------------|---------|
| 3-6                   | 3.92±2.23          | 6.04±1.50    | <0.001  |
| 6-12                  | 3.32±1.70          | 4.67±1.51    | <0.001  |
| 12-24                 | 1.92±0.64          | 3.29±0.98    | <0.001  |

Wang et al. found that 10 mg and 5 mg dexamethasone were more effective than saline in preventing nausea and vomiting associated with epidural morphine for post-caesarean analgesia. The differences between 10 mg and 5 mg dexamethasone were not statistically significant. They also found that dexamethasone did not influence the efficacy of epidural morphine-related analgesia.\(^{19}\)

The two studies demonstrated that dexamethasone has significant effect on reducing pain and the usage of injectable narcotics in lumbar disc surgery.\(^{20,21}\) Glasser reported that the effect of intravenous dexamethasone might be due to the preemptive effect on the nociceptor c fiber and suppression of the inflammation that results from intraoperative tissue trauma.\(^{22}\) The authors reported that steroids have an analgesic effect in laparoscopic surgery.\(^{23}\) Indeed, steroids have been used to reduce pain after laparoscopic and dental surgeries.\(^{24,26}\)

Steroids have a powerful anti-inflammatory as well as analgesic property; however, the mechanism of analgesia induced by corticosteroid is not fully understood. Acute noxious stimulation of peripheral tissues leads to the sensitization of dorsal horn neurons of the spinal cord by the release of substances such as glutamate and aspartate. These amino acids activate N-methyl-D-Aspartate receptors, resulting in calcium ion influx, which leads to the activation of phospholipase A2, which converts membrane phospholipase to arachidonic acid. Corticosteroids are capable of reducing prostaglandin synthesis by the
inhibition of phospholipase A2 through the production of calcium-dependent phospholipid-binding proteins called annexins and by the inhibition of cyclooxygenases during inflammation.\textsuperscript{27,28}

CONCLUSION

Intravenous administration of 8 mg dexamethasone was ineffective for prophylaxis of nausea, vomiting, and pruritus for patients receiving neuraxial meperidine in cesarean delivery. However, dexamethasone enhances postoperative analgesia compared with placebo.

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How to cite this article: Banihashem N, Hasannasab B, Alereza H. Does dexamethasone prevent subarachnoid meperidin-induced nausea, vomiting and pruritus after cesarean delivery?. Saudi J Anaesth 2013;7:138-41.

Source of Support: Nil, Conflict of Interest: None declared.