ORIGINAL ARTICLE

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

Nadia Banihashem,
Bahman Hasannasab,
Hakimeh Alereza

Department of Anaesthesia, Babol University of Medical Science, Babol, Iran

Address for correspondence:
Dr. Nadia Banihashem,
Department of Anaesthesia,
Rohani Hospital, Daneshgah Sq.,
Ganjafrooz Avenue, Babol, Iran.
E-mail: nbanihashem@yahoo.com

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 naloxane, dexamethasone, droperiodol, 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.

Access this article online	
Quick Response Code:	Website: www.saudija.org
	DOI: 10.4103/1658-354X.114057

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 L_3-L_4 or L_4-L_5 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

Parametr	Dexamethasone *N*=25	Control *N*=27	*P* value
Age (years)	28.36±4.66	28.30±5.53	0.965
Weight (Kg)	80.52±12-64	79.24±15.19	0.744
Duration of surgery (minutes)	41.60±3.46	43.63±6.87	0.182

Table 2: Postoperative nausea and vomiting and pruritus

Parameter	Dexamethasone *N*=25	Control *N*=27	*P* value
Pruritus	10 (43.5)	13 (56.5)	0.554
Nausea	5 (20%)	10 (37%)	0.175
Vomiting	3 (12%)	6 (22.2%)	0.469

Table 3: Visual analogue scale score 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

better postoperative patient comfort and decreasing perioperative analgesic consumption.[8]

Previous investigators found dexamethasone to be an effective antiemetic after general and epidural anesthesia.[9-11] Wu *et al.* reported that dexamethasone alone was not an effective antiemetic but a combination of dexamethasone 4 mg and dropridol 6.25 mg reduced the incidence of PONV after spinal morphine 0.2 mg for cesarean section compared with placebo; indeed, the VAS score 6-24 h postoperatively was reduced in the dexamethasone group.[12] Szarvas *et al.* demonstrated that dexamethasone 8 mg IV plus ondansetron 4 mg IV was as effective as ondansetron 8 mg alone in the prophylaxis of PONV in patients undergoing major orthopedic operation with spinal morphine. Dexamethasone alone was associated with a frequent failure rate of PONV prophylaxis. The incidence of pruritus was also similar in each group during the 24 h observation period.[13]

The mechanism of the antiemetic action of dexamethasone is still not clearly known. Glucocorticoid receptors are found in the nucleus of the solitary tract, the raphe nucleus, and the postrema area, and all are associated with regulating nausea and vomiting. Dexamethasone may affect PONV by modulating neurotransmission or receptor density in these nuclei.[11]

Khan *et al.* reported that intrathecal meperidine increased the incidence of nausea and vomiting in cesarean section.[14] Movafege *et al.* found that the administration of IV dexamethasone prior to intrathecal meperidine injection reduces postoperative pain, nausea, and vomiting.[15]

Nortcliffe found that IV cyclizine administered immediately after elective caesarean section significantly decreased the incidence and severity of nausea and vomiting, and the need for rescue antiemetic therapy; however, dexamethasone was ineffective in preventing nausea and vomiting.[16] A study found that intrathecal dexamethasone for prevention of PONV in patients undergoing cesarean delivery significantly decreased the incidence and severity of nausea and vomiting and the need for rescue antiemetic therapy. The incidence of severe pruritus related to the use of intrathecal morphine was also decreased in the dexamethasone group.[17]

Allen found dexamethasone to be an effective antiemetic for women receiving intrathecal morphine for cesarean delivery. In addition, dexamethasone reduced 24 h VAS and use of rescue analgesics. However, dexamethasone was not effective for the prophylaxis against neuraxial morphine-induced pruritus.[18]

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-cesarean 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.[27,28]

CONCLUSION

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

REFERENCES

1. Szarvas S, Harmon D, Murphy D. Neuraxial opioid-induced pruritus: A review. J Clin Anesth 2003;15:234-9.
2. Ngan Kee WD. Intrathecal pethidine: Pharmacology and clinical applications. Anaesth Intensive Care 1998;26:137-46.
3. Yang T, Breen TW, Archer D, Fick G. Comparison of 0.25 mg and 0.1 mg intrathecal morphine for analgesia after Cesarean section. Can J Anaesth 1999;46:856-60.
4. Siddik-Sayyid SM, Aouad M. Granisetron or ondansetron for prevention of subarachnoid morphine-induced pruritus after cesarean delivery. Int J Obstet Anesth 2010;19:457-8.
5. Tamdee D, Charuluxananan S, Punjasawadwong Y, Tawichasri C, Patumanond J, Sriprajittichai P. A randomized controlled trial of pentazocine versus ondansetron for the treatment of intrathecal morphine-induced pruritus in patients undergoing cesarean delivery. Anesth Analg 2009;109:1606-11.
6. Tan PH, Liu K, Peng CH, Yang LC, Lin CR, Lu CY. The effect of dexamethasone on postoperative pain and emesis after intrathecal neostigmine. Anesth Analg 2001;92:228-32.
7. Thomas S, Beevi S. Epidural dexamethasone reduces postoperative pain and analgesic requirements. Can J Anaesth 2006;53:899-905.
8. Förster JG, Rosenberg PH. Clinically useful adjuvants in regional anaesthesia. Curr Opin Anaesthesiol 2003;16:477-86.
9. Tzeng JI, Wang JJ, Ho ST, Tang CS, Liu YC, Lee SC. Dexamethasone for prophylaxis of nausea and vomiting after epidural morphine for post-caesarean section analgesia: Comparison of droperidol and saline. Br J Anaesth 2000;85:865-8.
10. Wang JJ, Ho ST, Lee SC, Liu YC, Liu YH, Liao YC. The prophylactic effect of dexamethasone on postoperative nausea and vomiting in women undergoing thyroidectomy: A comparison of droperidol with saline. Anesth Analg 1999;89:200-3.
11. Balki M, Carvalho JC. Intraoperative nausea and vomiting during cesarean section under regional anesthesia. Int J Obstet Anesth 2005;14:230-41.
12. Wu JI, Lo Y, Chia YY, Liu K, Fong WP, Yang LC, *et al*. Prevention of postoperative nausea and vomiting after intrathecal morphine for Cesarean section: A randomized comparison of dexamethasone, droperidol, and a combination. Int J Obstet Anesth 2007;16:122-7.
13. Szarvas S, Chellapuri RS, Harmon DC, Owens J, Murphy D, Shorten GD. A comparison of dexamethasone, ondansetron, and dexamethasone plus ondansetron as prophylactic antiemetic and antipruritic therapy in patients receiving intrathecal morphine for major orthopedic surgery. Anesth Analg 2003;97:259-63.
14. Khan ZH, Zanjani AP, Makarem J, Samadi S. Antishivering effects of two different doses of intrathecal meperidine in caesarean section: A prospective randomised blinded study. Eur J Anaesthesiol 2011;28:202-6.
15. Movafegh A, Soroush AR, Navi A, Sadeghi M, Esfehani F, Akbarian-Tefaghi N. The effect of intravenous administration of dexamethasone on postoperative pain, nausea, and vomiting after intrathecal injection of meperidine. Anesth Analg 2007;104:987-9.
16. Nortcliffe SA, Shah J, Buggy DJ. Prevention of postoperative nausea and vomiting after spinal morphine for caesarean section: Comparison of cyclizine, dexamethasone and placebo. Br J Anaesth 2003;90:665-70.
17. Abdel-Aleem M, Osman A, Morsy K. Effect of coadministration of dexamethasone with intrathecal morphine on postoperative outcomes after cesarean delivery. Int J Gynaecol Obstet 2012;116:158-61.
18. Allen TK, Jones CA, Habib AS. Dexamethasone for the prophylaxis of postoperative nausea and vomiting associated with neuraxial morphine administration: A systematic review and meta-analysis. Anesth Analg 2012;114:813-22.
19. Wang JJ, Ho ST, Wong CS, Tzeng JI, Liu HS, Ger LP. Dexamethasone prophylaxis of nausea and vomiting after epidural morphine for post-Cesarean analgesia. Can J Anaesth 2001;48:185-90.
20. Karst M, Kegel T, Lukas A, Lüdemann W, Hussein S, Piepenbrock S. Effect of celecoxib and dexamethasone on postoperative pain after lumbar disc surgery. Neurosurgery 2003;53:331-6.
21. Watters WC 3rd, Temple AP, Granberry M. The use of dexamethasone in primary lumbar disc surgery. A prospective, randomized, double-blind study. Spine 1989;14:440-2.
22. Glasser RS, Knego RS, Delashaw JB, Fessler RG. The perioperative use of corticosteroids and bupivacaine in the management of lumbar disc disease. J Neurosurg 1993;78:383-7.
23. Callery MP. Preoperative steroids for laparoscopic surgery. Ann Surg 2003;238:661-2.
24. Baxendale BR, Vater M, Lavery KM. Dexamethasone reduces pain and swelling following extraction of third molar teeth. Anaesthesia 1993;48:961-4.
25. Liu K, Hsu CC, Chia YY. The effect of dose of dexamethasone for antiemesis after major gynecological surgery. Anesth Analg 1999;89:1316-18.
26. Aasboe V, Raeder JC, Groegaard B. Betamethasone reduces postoperative pain and nausea after ambulatory surgery. Anesth Analg 1998;87:319-23.
27. McCormack K. The spinal actions of nonsteroidal anti-inflammatory drugs and the dissociation between their anti-inflammatory and analgesic effects. Drugs 1994;47:28-45.
28. Holte K, Kehlet H. Perioperative single-dose glucocorticoid administration: Pathophysiologic effects and clinical implications. J Am Coll Surg 2002;195:694-712.

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.