

Postoperative Nausea and Vomiting in Patients Undergoing Total Abdominal Hysterectomy Under Subarachnoid Block: A Randomized Study of Dexamethasone Prophylaxis

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ABSTRACT

Background

Postoperative nausea and vomiting is a common distressing problem in patients undergoing gynaecological surgery under anaesthesia including central neuraxial blockade, which requires frequent medical interventions.

Objectives

We aimed to find out the antiemetic effect of prophylactic dexamethasone for prevention of postoperative nausea and vomiting in patients undergoing total abdominal hysterectomy under subarachnoid block. Influences of dexamethasone on patient satisfaction and postoperative analgesia were also observed as secondary objectives.

Methods

This was a prospective, randomized, double blind, placebo controlled study conducted in BPKIHS, a Tertiary care University based hospital from January 2009 to April 2009, for a period of four months. This study involved 80 American Society of Anaesthesiologist Physical Status I&II patients undergoing total abdominal hysterectomy under subarachnoid block. Patients were divided into two groups of 40 each to receive either 4 mg of dexamethasone (group D) or normal saline (group N) in volume of 2 ml intravenously 1 hour prior to subarachnoid block. Surgery was allowed to start with block height of at least T8 dermatome. Intraoperative and postoperative nausea and vomiting was observed using nausea and vomiting scale every 4 hour for 24 hours.

Results

Seven (17.4%) patients in group D and 11 (27.5%) patients in group N had nausea and vomiting in the intraoperative period (P=0.284). Sixteen (40%) patients in group D experienced nausea and vomiting in the postoperative period as compared to 27 (67.5%) in group N (P=0.0136). Accordingly, the mean requirement of rescue antiemetic was less in group D compared to Group N (P=0.042). Further, only 15 (37.5%) patients in group D required postoperative supplemental analgesic as compared to 23 (57.5%) in group N (P=0.058). After 24 hrs of surgery, 26 (65%) patients expressed satisfaction in group D as compared to 16 (40.0%) in group N (P=0.025).

Conclusions

Use of dexamethasone prior to subarachnoid block in patients undergoing total abdominal hysterectomy significantly reduces the incidence of nausea and vomiting and the requirement of antiemetic in the postoperative period, with better patient satisfaction.

KEY WORDS

Dexamethasone, gynaecological surgery, postoperative nausea and vomiting, subarachnoid block

INTRODUCTION

Postoperative nausea and vomiting (PONV) is a common, troublesome and potentially hazardous complication of anaesthesia and surgery, with an estimated incidence as high as 70 - 80 % in high risk patients.^{1,2} Though reported incidence of PONV with regional anaesthesia is lower compared to general anaesthesia, its deleterious effects to the individual patient is not different.³ Among various associated risk factors, gynaecological surgeries have also been identified as an independent risk factor for PONV.⁴

When severe, PONV is associated with wound dehiscence, bleeding, electrolyte imbalance, dehydration and pulmonary aspiration of gastric contents, resulting in prolonged hospital stay and increased health care cost.⁵ Therefore, the prevention and treatment of PONV has always remained an important responsibility of anaesthesia care provider.

Various prophylactic antiemetics have been used for the prevention and control of PONV. Dexamethasone has been shown to be effective prophylactic antiemetic with limited side effects during postoperative period. Further, it has been reported to have an additional advantage of reducing postoperative fatigue, pain and total analgesic requirement.⁶

Although, plenty of literature is available on the use of dexamethasone as prophylactic antiemetic in major gynaecological surgeries under general anaesthesia, its use under spinal anaesthesia is limited. Therefore, the present study was designed primarily to find out the effects of dexamethasone as a prophylactic antiemetic in patients undergoing total abdominal hysterectomy under subarachnoid block. Influences of dexamethasone prophylaxis on patient satisfaction and postoperative analgesia were also observed and documented as secondary objectives.

METHODS

This was a prospective, randomized, double blind, placebo controlled study conducted in BPKIHS, a Tertiary care University based hospital from January 2009 to April 2009, for a period of four months. After obtaining institutional ethics committee approval and informed consent from all patients, this study was carried out in 80 American Society of Anaesthesiologist Physical Status I&II patients undergoing total abdominal hysterectomy (TAH) under subarachnoid block (SAB).

Patients receiving antiemetics and with history of hypersensitivity to steroid were excluded. All patients' age, weight, height, body mass index (BMI) and the prior history of motion sickness, vertigo, nausea and vomiting were noted. Patients were kept nil per orally for 8 hours before anaesthesia and were premedicated with tablet diazepam 10 mg orally, the night before and 2 hours prior to surgery.

Patients were randomly allocated to receive 2 ml of either 4 mg dexamethasone (Group D) or normal saline (Group N) intravenously, 1 hr before SAB according to computer generated random order. The study medications were given by one of the investigators not involved in observing the outcome parameters.

All patients were preloaded with Ringers lactate (10 ml/kg). Heart rate, electrocardiogram, non-invasive blood pressure, pulse oximetry (SpO₂) were monitored throughout the surgery. All patients received continuous oxygen at 2 l/min using nasal prongs. Under all aseptic precautions, SAB was performed in lateral position using 25 G Quenke's spinal needle, at L₃ -L₄ interspace with 3.4 ml of 0.5 percent hyperbaric bupivacaine. The level of sensory blockade achieved after 10 min of giving SAB was noted and the surgery was allowed to start only with a block height of T8 dermatome.

In the intraoperative period, hypotension (SBP<20% of the preoperative value) was corrected with intravenous fluid and intravenous boluses of mephentermine 3 mg, bradycardia (HR<60/min with hypotension or <50/min without hypotension) was treated with intravenous bolus of atropine 0.3 mg and nausea and vomiting was treated with bolus of ondansetron 4 mg, intravenously.

PONV was graded (0=no nausea and vomiting, one-nausea without vomiting, two-nausea with vomiting < 3 episodes, three-nausea with vomiting > 3 episodes) and documented every 4 hours till 24 hours after surgery.⁷ Any episode of PONV was treated with ondansetron four mg intravenously as a rescue antiemetic and was documented.

After the surgical procedure, when the level of sensory block receded to T10 level or patient complained of pain, whichever occurred first, intramuscular diclofenac sodium 75 mg was given and was repeated 8 hourly up to 24 hrs and then given orally thereafter. Supplemental analgesia for breakthrough pain was provided with slow intravenous tramadol 50 mg.

Postoperative pain was assessed using 10 cm visual analogue scale (VAS)(0= no pain, 10= worst pain imaginable), at the beginning of the demand of rescue analgesic and 30 min after giving the analgesic up to 24 hrs. The overall patients' satisfaction and the reasons for satisfaction or dissatisfaction were noted after 24 hrs.

The collected data was entered in Micro Soft Excel 2010 and then transferred it in to statistical package for social science (SPSS PC+17) for statistical analysis. Chi square test was used for qualitative variables and t-test for quantitative variables to find out the significant differences between the groups D and N. The sample size (40 patients in each group) was estimated to detect a decrease in the incidence of nausea and vomiting from 50 percent to 20 percent with dexamethasone prophylaxis, with power of 80 percent and a confidence interval of 95 percent.⁸ The P-value of less than 0.05 was considered statistically significant.

RESULTS

Patient characteristics and the factors related to anaesthesia and surgery that may modify the incidence of PONV were similar between the two groups (table 1).

Intraoperative nausea and vomiting occurred in seven

Table 1. Patient characteristics and factors related to surgery and anaesthesia.

Parameters	Group D (n=40)	Group N (n=40)	p-value
Age (yr)	44 ± 6	45 ± 9	0.435
Weight (kg)	52 ± 9	51 ± 7	0.577
Height (cm)	152 ± 8	149 ± 10	0.213
BMI (kg/m ²)	23.0 ± 3.0	23.0 ± 3.3	0.997
No. of patients with risk factors: history of either motion sickness or vertigo or nausea and vomiting (%)	16 (40%)	15 (37.5%)	0.818
Baseline heart rate (beats/min)	83 ± 9	82 ± 13	0.794
Baseline mean BP (mm hg)	93 ± 9	94 ± 11	0.773
No. of patients with Sensory blockade level 10 min after SAB (T ₄ / T ₆ / T ₈)	4/29/7	3/26/11	0.305
No. of patients with Intraoperative hypotension (%)	10 (25%)	14 (35%)	0.329
Intraoperative fluid used (l)	3.3 ± 1.6	2.9 ± 1.3	0.265
Blood loss (ml)	226 ± 11	238 ± 95	0.235
Duration of Surgery (min)	87 ± 23	86 ± 22	0.922

Table 2. Comparison of, incidence of different grades of postoperative nausea and vomiting. Values are expressed as number (%).

PONV Grading	Group D	Group N
0	24 (60%)	13 (32.5%)
1	11 (27.5%)	20 (50%)
2	5 (12.5%)	3 (7.5%)
3	-	4 (10%)

Table 3. Comparison of incidence of PONV in patients with risk (with the history of motion sickness, vertigo, nausea and vomiting) and without risk. Values are expressed as number.

	Group D	Group N
Patients with PONV / All patient	16/40	27/40
Patients with risk, developing PONV / patients with risk	8/16	11/15
Patients without risk, developing PONV / patients without risk	8/24	16/25

(17.5%) and 11 (27.5%) patients in Groups D and N

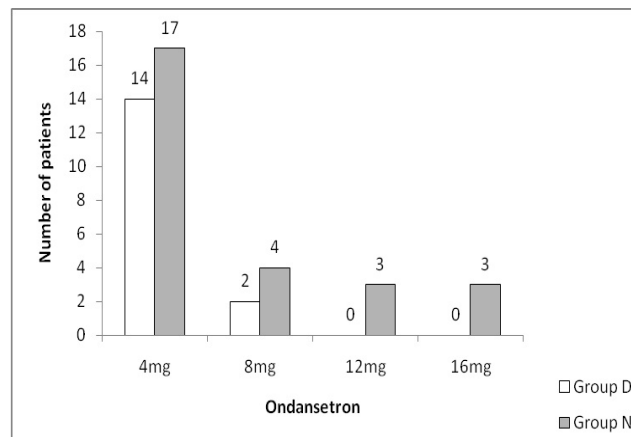
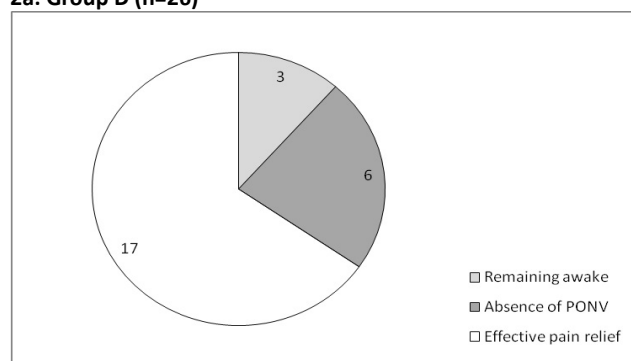


Figure 1. Requirement of rescue antiemetic in the postoperative period.

2a: Group D (n=26)



2b: Group N (n=16)

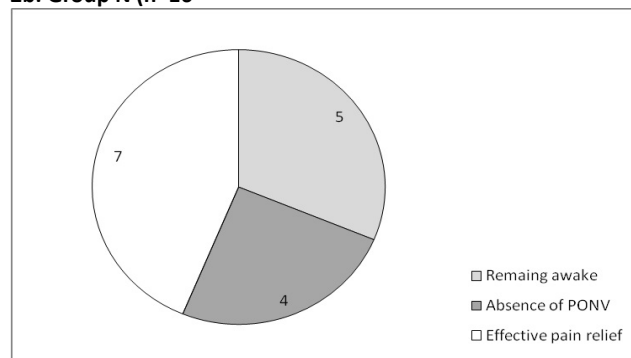


Figure 2. Frequency of satisfied patients and reasons for their satisfaction. Values are expressed as numbers.

respectively with no statistical difference (P=0.284). In the postoperative period, significantly less number of patients i.e. 16 (40%) in Group D experienced nausea and vomiting compared to 27 (67.5%) in Group N (P=0.013) (table2). Further, the mean requirement of rescue antiemetic in patients developing postoperative nausea and vomiting was significantly less in patients of Group D than in Group N (4.5 ± 1.3 mg vs. 6.8 ± 4.2 mg, P=0.042) (fig 1). Nineteen (61%) of 31, high risk patients developed nausea and vomiting in the postoperative period (table-3). Twenty-three (57.5%) patients in Group N and only 15 (37.5%) patients in Group D required rescue analgesic in the postoperative period (P =0.058).

After 24 hrs of surgery, 26 (65%) patients in group D expressed overall satisfaction compared to only 16 (40.0%) in group N (P =0.025) (fig 2). Of the 14 unsatisfied patients

in group D, eight (57.1%) patients expressed PONV and six (42.9%) inadequate pain relief as the reasons for their dissatisfaction. In group N, 16 (69.6%) and eight (30.4%) patients expressed PONV and inadequate pain relief respectively as the reasons for their dissatisfaction ($P=0.079$).

DISCUSSION

Dexamethasone has been shown to be an effective antiemetic in patients receiving cancer chemotherapy.⁹⁻¹¹ Though, few investigations have failed to demonstrate postoperative antiemetic and analgesic effects, several studies have shown that dexamethasone effectively decreases the incidence of PONV, and provides postoperative analgesia.^{6,10,12-14,16,17} The exact mechanism of dexamethasone induced antiemetic and analgesic effects still remains to be fully understood. However, it has been postulated to be related to inhibition in the synthesis of prostaglandins, associated with triggering of emesis and inflammatory response.¹⁸ Antagonism of 5HT-receptors in the central nervous system is another possible mechanism of antiemetic effects of dexamethasone.⁹ Finding out whether there are any specific mechanisms of antiemetic effect of dexamethasone in PONV associated with central neuraxial block could be an interesting topic of investigation.

Various doses of dexamethasone ranging from 1.25-25mg have been used for reducing PONV with varying success.^{13,19} Since a dose of 2.5 or 5 mg were found to be equally effective as 10mg in reducing the incidence of postoperative emesis in patients undergoing major gynaecological surgeries, a dose of 4 mg was chosen in this study.¹³

Our study has shown that prophylactic use of 4 mg dexamethasone intravenously 1 hour prior to SAB, in patients undergoing TAH, significantly reduces the incidence of nausea and vomiting and the requirement of antiemetics in the postoperative period.

The incidence of intraoperative nausea and vomiting were not significantly different between the two groups in our study. This finding is quite expected as we had administered dexamethasone 1 hour prior to SAB and the onset of antiemetic effect of prophylactic dexamethasone is approximately 2 hours.²⁰

Our study showed almost 28% reductions in the incidence of PONV with the use of dexamethasone. This finding is similar to the findings by Gautam et al and Tjeng et al who showed 23.4% and 32% decrease in the incidence of PONV respectively with the use of prophylactic dexamethasone although there were number of differences for comparison between our and their studies in terms of types of surgery, anesthetic technique employed, analgesic used and the overall study design itself.^{21,22}

Significant reduction in the need of rescue antiemetic in dexamethasone group in our study in consistence

with previous studies, further confirms its antiemetic effect.^{13,20,23} Thus, our finding shows effective prevention of PONV associated with central neuraxial blockade with the use of prophylactic dexamethasone.

Various reasons have been mentioned for PONV in patients undergoing surgeries under central neuraxial block including hypotension, hyper peristalsis, traction on nerve endings and plexus, hypoxemia etc.²⁴ The etiology of PONV after gynaecological surgery is multifactorial. A number of factors, including age, obesity, history of motion sickness or previous PONV, menstrual cycle, surgical procedure and postoperative pain, are considered to increase the incidence of PONV.^{25,26}

One can note that the incidence of PONV following SAB in our study is higher in both the intervention and control groups than that in the reported literature.^{8,13,16} We attribute this to the major gynaecological surgery and female sex that we chose in our study as both are considered as significant risk factors for PONV in themselves.^{3,4} Presence of significant proportion of high risk patients (i.e. with the history of motion sickness, vertigo, nausea and vomiting) as well as the use of tramadol as a rescue analgesic could have further contributed to the higher incidence of PONV in our study.²

As reported by Bisgaard T et al, we also observed decreased analgesic requirement in patients receiving dexamethasone almost becoming statistically significant.⁶ Reduction in pain, analgesic requirement and duration of convalescence substantiated by reduction in the inflammatory marker C-reactive protein has been reported with the use of dexamethasone.⁶

In our study, we observed better overall patient satisfaction with the use of prophylactic dexamethasone. Interestingly, nausea and vomiting was reported by most of the subjects who were not satisfied as the major reason for their dissatisfaction.

The use of tramadol as a rescue analgesic in the postoperative period was the main limitation of our study.

CONCLUSION

We conclude that prophylactic use of dexamethasone prior to SAB in patients undergoing TAH significantly reduces the incidence of nausea and vomiting and the requirement of antiemetic in the postoperative period, with better patient satisfaction. Hence in the absence of specific contraindications, we recommend routine use of dexamethasone in patients undergoing TAH under SAB.

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