Original Article

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Role of Intraoperative Dexamethasone with Propofol to Improve Outcome after Laparoscopic Surgeries

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Abstract

Despite advances in anesthetic drugs and techniques, post-operative nausea and vomiting (PONV) remain the second most common post-operative complaint after surgery. Despite the increasing attention to postoperative pain control, PONV is still considered a minor complication. In the absence of antiemetic treatment, the estimate puts the incidence of PONV at 25-30% for all surgical interventions and patient populations. Pharmacological approaches based on anticholinergics, antihistamines, phenothiazines, butyrophenones, benzamides, corticosteroids and serotonin receptor antagonists have been investigated in the prevention and treatment of PONV, with various results. Dexamethasone may offer additional benefits over traditional antiemetics in improving the surgical outcomes. Compared with placebo, 8 mg of Dexamethasone given intravenously 90 minutes before laparoscopic cholecystectomy (LC) has been demonstrated to reduce PONV significantly. Combination of both Propofol and Dexamethasone may reduce the chances of PONV and additionally decreases incidence of sore throat in patients operated for laparoscopic cholecystectomy. The limitation of this study was that we could not measure the cuff pressure and did not use fibre optic bronchoscope to assess the amount of tissue damage. Our study was not designed for extended follow up beyond 24 hours, as the process of acute inflammation usually peaks by 24 hours. Sore throat, hoarseness and cough cannot be assessed objectively and there are inter individual variations and hence, a chance of bias always exists. The BMI of our patients in the two groups were comparable and we used standard sized tubes of the same manufacturer to ameliorate the possible error due to different tube size and quality.

Keywords: Dexamethasone; Propofol; Laparoscopy; Metoclop Ramide.

Introduction

Despite advances in anesthetic drugs and techniques, post-operative nausea and vomiting (PONV) remain the second most common postoperative complaint after surgery. Despite the increasing attention to postoperative pain control,PONV is still considered a minor complication [1].

The determination of true incidence of PONV is difficult due to the lack of a single stimulus of onset and multiple etiologies (medical, surgical and those related to patient and anesthesia). In the absence of antiemetic treatment, the estimate puts the incidence of PONV at 25-30 % for all surgical interventions and patient populations. Of these, 0.18 % of cases are resistant to PONV [2]. Nevertheless, when compared to other operations, the incidence rate of PONV after laparoscopic cholecystectomy is higher owing to indirect stimulation of vestibular afferent fibers. Based on records, the PONV rate in patients who received no antiemetic treatment after laparoscopic cholecystectomy ranges from 62 % to 80 %.

Pharmacological approaches based on anticholinergics, antihistamines, phenothiazines, butyrophenones, benzamides, corticosteroids, and serotonin receptor antagonists have been investigated in the prevention and treatment of PONV, with various results [3,4].

Dexamethasone may offer additional benefits over traditional antiemetics in improving the surgical outcomes. Compared with placebo 8 mg of Dexamethasone given intravenously 90 minutes before laparoscopic cholecystectomy (LC) has been demonstrated

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to reduce PONV significantly. Combination of both Propofol and Dexamethasone may reduce the chances of PONV and additionally decreases incidence of sore throat in patients operated for laparoscopic cholecystectomy. This prospective, randomized, double-blind study aimed to evaluate the efficacy and safety of a small dose of Propofol and 8 mg of Dexamethasone for the prevention of PONV in patients undergoing laparoscopic cholecystectomy [5].

Material and Methods

Study included 100 adult patients scheduled for laparoscopic cholecystectomy operation with American Society of Anesthesiologist (ASA) risk I or II. The patients were randomly assigned into two groups. The patients in Group 1 received Propofol plus 8 mg Dexamethasone. The Group II served as placebo control group. The patients were assigned to one of the two study groups using a computer-generated random number table. Those with a history of hepatic, renal or cardiovascular diseases, chronic obstructive pulmonary disease, hematological and / or gastrointestinal disorders, hypersensitivity to Propofol or any other drugs, as well as patients with history of vertigo and motion sickness, pregnant or menstruating patients, and patients who had taken antiemetics 24 hours before the surgery were excluded from the study.

The patients fasted for eight hours before the operation and were not premedicated. At the operation room, the heartbeat rates (HBR), systolic (SAP), diastolic (DAP), and mean (MAP) arterial pressures and peripheral oxygen saturations of the patients were monitored.

All patients in the two groups were induced with Propofol 2.5 mg/kg (intravenous, bolus dose) followed by Fentanyl at a dose of 2 mcg/Kg and Sevoflurane inspiration at 2 % concentration. After receiving Vecuronium (0.1 mg/kg), the patients were orally intubated and mechanically ventilated with O_2/air (30% ,70%), 3 L/min in closed circuit with $EtCO_2$maintained at 35-40 mmHg. The maintenance doses of Fentanyl and Sevoflurane were adjusted for hemodynamic stability. Throughout the operation, hydration was maintained with infusion of isotonic glucose saline or ringer lactate solution at a rate of 3-5 ml / kg / hr.

Towards the end of surgery (skin incision closure), the patients in Group I were given Propofol in an intravenous dose of 0.5 mg / kg (bolus) plus 8 mg of Dexamethasone while Group II (control) was given intravenous N.S (bolus) in the same volume. All syringes with Propofol, Dexamethasone or placebo were prepared by the same investigator. Administration of anesthesia and drugs used in the study and intraoperative data collection were made by other investigators blinded to the study drugs.

At the time of the last surgical suture, all anesthetic agents were terminated and the time was recorded. The lungs were manually ventilated with 100 % oxygen (3 L / min) until achieving spontaneous respiration. Residual muscle relaxation was antagonized with Neostigmine in a dose of 0.05 mg / kg and Atropine in a dose of 0.02 mg / kg (1).The patients were appropriately extubated. Sedation was assessed after cholecystectomy operation and for the following six postoperative hours as per the modified Ramsay Sedation Score (where 1 = anxious, agitated, restless, 2 = awake, cooperative, oriented, tranquil, 3 = semi sleep but responds to commands, 4 = asleep but responds briskly to glabellar tap or loud auditory stimulus, 5 = asleep with sluggish or decreased response to glabellar tap or loud auditory stimulus, 6 = no response can be elicited).

All patients were removed to postoperative recovery room and monitored after extubation. They were kept in this room for evaluation of potential postoperative complications and recovery for a minimum of one hour.

The degree of postoperative nausea and vomiting were scored using Nausea Vomiting Scale (NVS) and for sore throat (Table 1) at 0-4, 4-12, 12-24 hours. Additional antiemetics (10mg of Metoclopramide) were administered intravenously when NVS score was = 3. The patients were observed for 24 hours postoperatively, while the time of the occurrence of nausea and vomiting, as well as that of additional administration of antiemetics and analgesics were recorded.

Statistical analysis was performed with SPSS statistical package for windows. Parametric values were evaluated by means.-

Table 1: Nausea vomiting score

Nausea vomiting scale	Nausea vomiting severity
0	No complaints
1	Mild nausea
2	Moderate nausea
3	Frequent vomiting (4 times)
4	Severe vomiting (continuous vomit).

Table 2: Differences in demographic parameters in the two groups [mean ± SD, (n)]

Results

Table 2: Differences in demographic parameters in the two groups [mean ± SD, (n)]

	Group I (n=50)	Group II (n=50)
Age (year)	41.9±11.4	44.6±11.3
Weight (kg)	69.9±11.3	70.2±10.3
Height (cm)	166.2±7.5	165.6±6.6
ASA (I/II)	35/15	37/13
Gender (F/M)	29/21	28/22
Sedation scores	2	2
Duration of operation (min)	178.5±35.7	183.8±45.2

Table 3: Number of patients experiencing nausea vomiting [n(%)]

	Group I (n=50)	Group II (n=50)
0-4 hour	16 (31.4)	32(71.4)
4-12hour	10(20)	20 (40)
12-24 hour	4 (5.7)	7(14.3)
Vomiting		
0-4 hour	14 (28.6)	32 (65.7)
4-12 hour	8 (17.1)	17 (34.3)
12-24 hour	3 (5.7)	6 (11.4)

Table 4: The number of patients subjected to NVS and additional antiemetics [median(25-75%), n (%)]

	Group I (n=50)	Group II (n=50)
Additional antiemetics	17 (28.6)	32 (65.7)
NVS	0(1.75)	0 (01.75)
Sore throat	3(5)	9 (19.3)

There was no significant difference among the study groups in terms of age, body weight, height, ASA group, gender, duration of operation and anesthesia (Table 2) ($p>0.05$).

The comparisons of groups for the number of patients with nausea showed a significant difference at 0-4 hours, while there were no statistically significant differences at 4-12 and 12-24 hours. The incidence of nausea at 0-4 hours was 31.4 % in Group I and 71.4 % in Group II ($p<0.0001$). The incidence rates of nausea in Group I and Group II were statistically significant ($p=0.002$).

The comparisons of groups as to the incidence of vomiting at 0- 4 hours showed a rate of 28.6 % in Group I, and 65.7 % in Group II, ($p<0.0001$). The incidence rates of vomiting in Group I and Group II were significant at 0-4 hours ($p=0.004$).

It was found out that there was a significant difference at 0-4 hours, while no significant differences were found between the values at 4-12 and 12-24 hours. There were significant differences between groups in the need for additional antiemetics. Seventeen patients in Group I, and 32 patients in Group II received Metoclopramide. Three patients in group I had sore throat post operatively compared to 9 patients in group II.

Discussion

To evaluate the efficiency of these agents, various parameters such as nausea and vomiting scores for four hours in the early postoperative period or for 24 postoperative hours, number and severity of vomiting, number of antiemetics required, amount of antiemetics used, hospitalization time, and problems caused by nausea and vomiting are studied[6,7].

In our study, we recorded and compared the severity of nausea and vomiting measured with NVS during 24 postoperative hours and number of patients with nausea, vomiting, and need for additional antiemetics during 0-4, 4-12, and 12-24 hours of the postoperative period. The results were expressed in percentages. Our results of PONV control provided during the first four hours of postoperative period show that immediate postoperative bolus of Propofol in dose of 0.5 mg/kg plus 8 mg of Dexamethasone were more effective than N.S. However, there were no significant differences in postoperative recovery[7,8,9].

PONV develops as a complication after anesthesia, and if not prevented, surgical recovery and hospitalization time are prolonged. This not only leads to patients' unpleasant hospital experience, it

also increases their health care costs. Prolonged vomiting may result in electrolyte imbalance (hypokalemia, hypochloremia, hyponatremic metabolic alkalosis) and dehydration, Mallory-Weiss tear, esophageal rupture, wound opening, and hematoma formation under skin flaps associated with abdominal, vascular, ocular or plastic surgery [10,11].

In this study, however, the treatment groups were similar as to patient demography, type of operation, anesthetics administered, and analgesics used postoperatively. Patients with a history of motion sickness and/or previous PONV and those menstruating were excluded from the study because they were at a remarkably high risk of PONV [12, 13].

In one study it was observed that 2.5 mg of Dexamethasone to be the minimum effective dose for preventing PONV in patients undergoing major gynecological surgery [14], while subsequent studies found 5 mg to be the minimum effective dose in patients undergoing thyroidectomy [15]. Dexamethasone is most effective in preventing PONV when it is administered immediately before the induction of anesthesia rather than near the end of anesthesia [15,16].

Longterm administration of Dexamethasone causes undesirable adverse effects such as an increased risk for infection, glucose intolerance, delayed wound healing, superficial ulceration of gastric mucosa, and adrenal suppression. In this study, however, these adverse effects were not related to a single dose of Dexamethasone. Adverse effects observed in the present study were not clinically important in any of the groups [17,18].

In earlier studies, the incidence rate of PONV associated with nitrous oxide (N2O) was high, while the incidence rate of PONV from combined administration of Sevoflurane and Fentanyl was lower[19]. Nitrous oxide is known to cause nausea and vomiting when administered as a sole anesthetic agent. Nitrous oxide also causes PONV due to changes in middle ear pressure or bowel distension due to diffusion into closed cavities [20]. Gan et al have recently reported consensus guidelines for managing PONV. Their conclusion is that the use of N_2O during maintenance of anesthesia should be avoided. Therefore, in the present study, we did not use this anesthetic gas.

It is known that positive pressure ventilation, full stomach, opioids, and anticholinergics used in premedication are among the factors increasing PONV in anesthesia induction [20, 21].

In the present study, premedication was not carried out in our cases. We tried to avoid strong positive pressure ventilation. Before extubation, we performed gastric aspiration in order to decrease the effect of factors increasing nausea and vomiting in the post-operative period. In order to neutralize patient dependent and anesthesia dependent factors, we tried to homogenize the study groups in terms of age, body weight, height, ASA group, gender, duration of operation and anesthesia. Such differences may be the cause of differences observed in above mentioned studies.

Conclusion

In conclusion, subhypnotic bolus doses of Propofol plus 8mg of Dexamethasone used at the end of laparoscopic cholecystectomy are effective than placebo and it also decreases incidence of sore throat in patients post extubation. Further studies are needed to compare the efficacy of subhypnotic doses of Propofol plus Dexamethasone with other commonly used and well established antiemetics.

References

1. Acalovschil. Postoperative nausea and vomiting. Curr Anaesth Crit Care. 2002; 13: 37-43.
2. KovacAL. Prevention and treatment of postoperative nausea and vomiting. Drugs. 2000; 59: 213-243.
3. Gan TJ, Meyer T, Apfel CC, Chung F, Davis PJ, Eubanks S, et al. Consensus guidelines for managing postoperative nausea and vomiting. Anesth Analg. 2003; 97: 62-71.
4. Watcha MF, White PF. Postoperative nausea and vomiting: its etiology, treatment, and prevention. Anesthesiology. 1992; 77: 162-184.
5. Unal Y, Ozsoylar O, Arslan M, Sariguney D, Akcabay M. Comparison of the efficacy of propofol and metoclopramide in preventing postoperative nausea and vomiting after middle ear surgery. Saudi Med J. 2009; 30: 778-782.
6. Isik B, Cekmen N, Arslan M, Ozsoylar O, Kordan AZ, Akcabay M. Comparison of the antiemetic effects of ondansetron and dexamethasone on middle ear surgery. Saudi Med J. 2006; 27: 646-651.
7. Borgeat A, Wilder-Smith OH, Wilder-Smith CH, Formi M, Suter PM. Propofol improves patient comfort during cisplatin chemotherapy: apilot study. Oncology. 1993; 50: 456-459.
8. Campbell NN, Thomas AD. Does propofol have an anti-emetic effect? A prospective study of the anti-emetic effect of propofol following laparoscopy. Anaesth Intensive Care. 1991; 19: 385-387.

9. Shi JJ, Wang YP, Sun WZ, Hung CP, Cherng YG, Lin SY, et al. The effect of low dose propofol for prevention of nausea and vomiting during spinal anesthesia for cesarean section. ActaAnaesthesiol Sin. 1994; 32: 95-98.

10. Tarhan O, Canbay O, Celebi N, Uzun S, Sahin A, Coºkun F, et al. Subhypnotic doses of midazolam prevent nausea and vomiting during spinal anesthesia for cesarean section. Minerva Anestesiol. 2007; 73: 629-633.

11. Song D, Whitten CW, White PF, Yu SY, Zarate E. Antiemetic activity of propofol after sevoflurane and desflurane anesthesia for outpatient laparoscopic cholecystectomy. Anesthesiology. 1998; 89: 838-843.

12. Fujii Y, Nakayama M. Prevention of postoperative nausea and vomiting with a small dose of propofol alone and combined with dexamethasone in patients undergoing laparoscopic cholecystectomy: A prospective, randomized, double-blind study. Surg Endosc. 2008; 22: 1268-1271.

13. Fujii Y, Nakayama M, Nakano M. Propofol alone and combined with dexamethasone for the prevention of postoperative nausea and vomiting in adult Japanese patients having third molars extracted. Br J Oral Maxillofac Surg. 2008; 46: 207-210.

14. Erdem AF, Yoruk O, Alici HA, Cesur M, Atalay C, Altas E, et al. Subhypnotic propofol infusion plus dexamethasone is more effective than dexamethasone alone for the prevention of vomiting in children after tonsillectomy. PaediatrAnaesth. 2008; 18: 878-883.

15. Kiu K, Hsu CC, Chia YY. The effective dose of dexamethasone for antiemesis after major gynecological surgery.Anesth Analg. 1999; 89: 1316-1318.

16. Wang JJ, Ho ST, Lee SC, Liu YC, Ho CM. The use of dexamethasone for preventing postoperative nausea and vomiting in females undergoing thyroidectomy: a dose-ranging study. Anesth Analg. 2000; 91: 1404-1407.

17. Schimmer BP, Parker KL. Adrenocorticotropic hormone; adreno-cortical steroids and their synthetic analogs; inhibitiors of the synthesis and actions of adrenocortical hormones. In: Hardman JG, Limbird LE, Molinoff PB, Ruddon RW, Gilman AG, eds. Goodman and Gilman the pharmacological basis of therapeutics. 10th ed. New York: McGraw- Hill. 2001; 1649-1677.

18. Nader ND, Simpson G, Reedy RL. Middle ear pressure changes after nitrous oxide anesthesia and its effect on postoperative nausea and vomiting. Laryngoscope. 2004; 114: 883-886.

19. American Society of Health System Pharmacists. Prevention and treatment of postoperative nausea and vomiting. Am J Health-Syst Pharm. 2005; 62: 1247-1260.

20. Naylor RJ, Inall FC. The physiology and pharmacology of postoperative nausea and vomiting. Anaesthesia 1994; 49 Suppl: 25.

21. Journal of palliative medicine, 2010; 13(5). mary annlie bert, inc.