

9. Samuels ML, Johnson DE, Holoye PY, Lanzotti VJ: Large dose bleomycin therapy and pulmonary toxicity. *JAMA* 235:1117-1120, 1976
10. Brown GW, Hasan FM, Barbee RA: Reversibility of severe bleomycin-induced pneumonitis. *JAMA* 239:2012-2014, 1978
11. Perux-Guerra F, Harlaleroud LE, Walsh RE, Costanzi JJ: Acute bleomycin lung. *Am Rev Respir Dis* 106:909-913, 1972
12. Selvin BL: Cancer chemotherapy: Implications for the anesthesiologist. *Anesth Analg* 60:425-433, 1981
13. Alfery DD, Benumof JL: Pulmonary diseases, Anesthesia and Uncommon Diseases. Edited by Katz J, Benumof J, Kadis LB. Philadelphia, WB Saunders, 1981, pp 221-267
14. Chung F: Cancer, chemotherapy and anesthesia. *Can Anaesth Soc J* 29:364-371, 1982
15. Marshall BE, Wyche MQ: Hypoxemia during and after anesthesia. *ANESTHESIOLOGY* 37:178-208, 1972
16. Rehder K, Sessler AD, Marsh HM: General anesthesia and the lung. *Am Rev Respir Dis* 112:541-563, 1975

Anesthesiology
60:67-69, 1984

Antiemetic Efficacy of Droperidol and Metoclopramide

SHEILA E. COHEN, MB, CH.B., F.F.A.R.C.S.,* WILLIAM A. WOODS, M.D.,† JANET WYNER, MB, CH.B.‡

Postoperative nausea and vomiting occur frequently in outpatients undergoing general anesthesia for therapeutic abortion and may delay discharge from the hospital. Droperidol administered in small doses before anesthesia, or intraoperatively, has been claimed to be an effective antiemetic.¹⁻⁵ However, there is concern that droperidol may prolong recovery. Metoclopramide, a drug with antiemetic and other potentially beneficial properties, is not associated with sedation. This study was designed to compare the efficacy and side effects of droperidol with those of metoclopramide, in an ambulatory surgical population.

METHODS

The study population consisted of 87 healthy female outpatients, 6 to 20 weeks pregnant, undergoing general anesthesia for therapeutic abortion (dilation and evacuation). The study was approved by the Committee on the Use of Human Subjects in Research and informed consent was obtained from all participants. Patients were assigned randomly to one of three groups and received, double blind, an iv injection of the study drug 2-10 min before induction of anesthesia. Treatments, which were prepared by a registered nurse with no other involvement in the study, consisted of placebo, *i.e.*, saline, 2 ml, (Group 1, $n = 30$); metoclopramide, 10 mg (Group 2, $n = 28$); or droperidol, 1.25 mg (Group 3, $n = 29$). In Group 3,

saline was added so that all treatments measured 2 ml. Anesthesia was provided with fentanyl, 75-125 μg iv, thiopental 3-4 mg/kg iv, nitrous oxide, 70%, and an iv succinylcholine infusion. Controlled ventilation via a mask was employed.

In the preoperative interview, a history of nausea and vomiting was sought. Intraoperatively, total drug dosage and the duration of anesthesia were recorded for each patient. The occurrence of nausea and vomiting on emergence from anesthesia and in the recovery room was noted. Recovery from anesthesia was assessed by the anesthesiologist in the operating room and by a trained nurse observer in the recovery room. The times from the end of anesthesia until the patient opened her eyes in response to repeated commands, sat up, walked, and was discharged from the recovery room were noted. State of arousal was evaluated at 15-min intervals by both the patient and an observer, each assigning a score of 0 to 5, where 0 reflected a patient who was fully alert and awake and 5 one who was unarousable. All patients received a take-home questionnaire, and an attempt was made to contact them by telephone the next day to determine the incidence of nausea, vomiting, and dizziness after discharge.

Data were analyzed using chi-square analysis and one-way analysis of variance, including Duncan's multiple range test. Differences were considered significant when $P < 0.05$.

RESULTS

Patients in all groups were similar with respect to age, height, gestational age, anesthetic drug dosage, and duration of anesthesia (table 1). Although similar numbers of patients in all groups had reported preoperative nausea, fewer of the patients who subsequently received metoclopramide had actually vomited during their pregnancy (table 2). The overall incidences of postoperative nausea

* Associate Professor of Anesthesia (Clinical).

† Fellow in Anesthesia.

‡ Assistant Professor of Anesthesia.

Received from the Department of Anesthesia, Stanford University School of Medicine, Stanford, California. Accepted for publication June 13, 1983.

Address reprint requests to Dr. Cohen: Department of Anesthesiology, Stanford University Medical Center, Stanford, California 94305.

Key words: Vomiting; antiemetic, droperidol, metoclopramide. Anesthesia: outpatient.

TABLE 1. Patient Characteristics and Anesthetic Dosage

	Age (yr)	Weight (kg)	Gestation (weeks)	Thiopental Dosage (mg)	Fentanyl Dosage (μ g)	Duration of Anesthesia (min)
Group 1—Placebo (n = 30)	24 \pm 7	60 \pm 6	15 \pm 4	309 \pm 93	108 \pm 24	19 \pm 6
Group 2—Metoclopramide (n = 28)	23 \pm 6	55 \pm 7*	13 \pm 4	263 \pm 64	103 \pm 22	18 \pm 7
Group 3—Droperidol (n = 29)	24 \pm 6	58 \pm 8	14 \pm 3	274 \pm 67	108 \pm 19	16 \pm 5

Values represent mean \pm SD.* $P < 0.05$.

and vomiting were 55% and 46%, respectively. Although there was a trend toward a lower incidence of nausea and vomiting in Group 3 patients, this difference was not statistically significant (table 2). Recovery from anesthesia, as measured by the time until patients opened their eyes on command and by the time until they attained an awake arousal score (0 or 1), was significantly delayed in patients who received droperidol (table 3). Surprisingly, metoclopramide seemed to accelerate certain aspects of recovery; patients in Group 2 were able to sit up, walk, and be discharged earlier than those in either of the other groups (table 3). Seventy per cent of women either returned their follow-up questionnaire or could be contacted after discharge. Of these patients, 78% in Group 3 complained of dizziness at home, compared with only 45% and 47%, respectively, in Groups 1 and 2 ($P < 0.05$). There were no differences among the groups with regard to postdischarge nausea, vomiting, or other symptoms.

DISCUSSION

As in other studies of ambulatory gynecologic patients, postoperative emetic sequelae were frequent.⁶ This may reflect the high incidence of preoperative nausea (63%) and vomiting (45%), which is common in women at this early stage of pregnancy. In addition, positive-pressure ventilation via a mask can result in gastric distension, which, with concurrent narcotic administration, may pro-

vide a potent stimulus for nausea and vomiting. Previous reports have claimed that droperidol, administered prophylactically in doses from 0.25 to 5 mg, is an effective antiemetic.¹⁻⁵ We, however, observed only an insignificant decrease in the incidence of emetic complications following droperidol. Furthermore, patients recovered from anesthesia more slowly and were more likely to suffer from dizziness after discharge. While some investigators have reported no increase in postoperative sedation with low doses (less than 1.25 mg) of droperidol,^{5,11} others, utilizing similar or larger doses have found, as we did, that prolonged sleepiness occurred.^{3,6,7} For example, Korttila *et al.*⁷ detected diminished performance in skills related to driving for up to 10 h after injection of droperidol, 5 mg.

The antiemetic efficacy of metoclopramide is a controversial subject. Tornetta⁸ and Dundee and Clarke⁹ found that 10 and 20 mg doses of metoclopramide reduced postoperative nausea and vomiting, particularly when premedication had included meperidine. However others,^{10,11} in agreement with our results, have found no beneficial effect from similar doses. The duration of action of metoclopramide is fairly brief, and better results have been obtained when this agent has been administered in

TABLE 2. Incidence of Nausea and Vomiting

	Group 1— Placebo (n = 30)	Group 2— Metoclopramide (n = 28)	Group 3— Droperidol (n = 29)	All Patients (n = 87)
Preoperative Nausea	21 (70%)	13 (46%)	21 (72%)	55 (63%)
Vomiting	14 (47%)	7* (25%)	18 (62%)	39 (45%)
Postoperative Nausea	18 (60%)	18 (64%)	12 (41%)	48 (55%)
Vomiting	14 (47%)	16 (57%)	11 (38%)	41 (46%)

Values represent numbers of patients, expressed as percentages in parentheses.

* $P < 0.05$ compared with Groups 1 and 3.

TABLE 3. Recovery Data

Time until patient:	Group 1— Placebo (n = 30)	Group 2— Metoclopramide (n = 28)	Group 3— Droperidol (n = 29)
Opened eyes	3 \pm 2	3 \pm 2	6 \pm 4*
Sat	35 \pm 17	26 \pm 10*	39 \pm 13
Walked	57 \pm 15	44 \pm 12*	59 \pm 13
Attained arousal score of 1 or 2	55 \pm 22	57 \pm 21	68 \pm 17†
Was discharged from recovery room	74 \pm 18	62 \pm 13†	75 \pm 19

Values are times in minutes (mean \pm SD) from the end of anesthesia until patient reached stated stage of recovery.* $P < 0.01$.† $P < 0.05$.

higher dosage and at the end of anesthesia.¹² In addition to its action on the chemoreceptor trigger zone, metoclopramide accelerates gastric emptying and increases lower esophageal sphincter tone, both of which should decrease the risk of developing aspiration pneumonitis. In a previous investigation utilizing a similar study population, we demonstrated decreased gastric volume following the iv injection of 10 mg of metoclopramide shortly before induction of anesthesia.¹³ Despite the lack of antiemetic effect in the current investigation, patients did seem to benefit from metoclopramide by being able to sit, walk, and be ready for discharge earlier than other patients. Decreased postoperative dizziness also has been reported in previous studies^{9,13} following administration of metoclopramide. The mechanism by which this agent accelerates recovery and ameliorates dizziness following anesthesia is unknown.

In summary, neither droperidol nor metoclopramide in the dose we employed was an effective antiemetic in this group of surgical outpatients. An increased dose of droperidol cannot be advocated in outpatients, because of its association with postoperative sedation and dizziness. Metoclopramide could be employed in larger doses, as it generally appears free from significant side effects. In these patients, in whom a narcotic technique is often selected in order to avoid the uterine relaxation that results from volatile inhalational agents, emetic stimuli may be too potent to reverse without causing undesirable side effects. Alternative anesthetic techniques utilizing diazepam or ketamine have proved less desirable for outpatient procedures. Despite the high incidence of emetic sequelae in our patients, discharge from the hospital was not delayed and no patient was incapacitated by prolonged nausea. Treatment of patients who experience protracted vomiting may be preferable to administering prophylactic

antiemetics, with their potential adverse effects, to all patients.

REFERENCES

1. Patton CM, Moon MR, Dannemiller FJ: The prophylactic antiemetic effect of droperidol. *Anesth Analg* 53:361-364, 1974
2. Tornetta FJ: A comparison of droperidol, diazepam and hydroxyzine hydrochloride as premedication. *Anesth Analg* 56:496-500, 1977
3. Mortensen PT: Droperidol (dehydrobenzperidol) Postoperative anti-emetic effect when given intravenously to gynaecological patients. *Acta Anaesth Scand* 26:48-52, 1982
4. Karhunen U, Orko R: Nausea and vomiting after local anesthesia for cataract extraction in elderly female patients. Effect of droperidol premedication. *Ophthalmic Surg* 12:810-812, 1981
5. Korttila K, Kauste A, Auvinen J: Comparison of domperidone, droperidol and metoclopramide in the prevention and treatment of nausea and vomiting after balanced general anesthesia. *Anesth Analg* 58:396-400, 1979
6. McKenzie R, Wadhwa RK, Lim Uy NT, Phitayakorn P, Tantisira B, Sinchioco C, Taylor FH: Antiemetic effectiveness of intramuscular hydroxyzine compared with intramuscular droperidol. *Anesth Analg* 60:783-788, 1981
7. Korttila K, Linnoila M: Skills related to driving after intravenous diazepam, flunitrazepam or droperidol. *Br J Anaesth* 46:961-969, 1974
8. Tornetta FJ: Clinical studies with the new antiemetic, metoclopramide. *Anesth Analg* 48:198-204, 1969
9. Dundee JW, Clarke RSJ: The premedicant and anti-emetic action of metoclopramide. *Postgrad Med J* 48:34-37, 1973
10. Ellis FR, Spence AA: Clinical trials of metoclopramide (Maxolon) as an antiemetic in anaesthesia. *Anaesthesia* 25:368-371, 1970
11. Shah ZP, Wilson J: An evaluation of metoclopramide (Maxolon) as an antiemetic in anaesthesia. *Br J Anaesth* 44:865-867, 1972
12. Clark MM, Storrs JA: The prevention of postoperative vomiting after abortion: Metoclopramide. *Br J Anaesth* 41:890-893, 1969
13. Wyner J, Cohen SE: Gastric volume in early pregnancy: effect of metoclopramide. *ANESTHESIOLOGY* 57:209-212, 1982

Significant Sinus Bradycardia Following Intravenous Lidocaine Injection

ROXOLANA J. DEMCZUK, M.D.*

Lidocaine, when administered iv to suppress tracheal reflexes prior to endotracheal intubation,¹ usually has minimal cardiovascular effects. A case of sinus bradycardia

associated with each administration of iv lidocaine is described below.

REPORT OF A CASE

A 79-year-old, 71-kg man, 4 weeks following an anterolateral myocardial infarction, was scheduled for insertion of an Austin Moore Prosthesis for his fractured hip. He had a history of left ventricular failure treated with digoxin and furosemide and ventricular ectopy controlled with procainamide. Preoperative 24-h ambulatory ECG monitoring (Holter monitor) and 12 lead electrocardiogram showed no evidence of sinus node disease. His serum digoxin level was 0.6

* Associate in Anesthesia.

Received from the Department of Anesthesia, Northwestern University Medical School, 303 East Superior Street, Room 360, Chicago, Illinois 60611. Accepted for publication June 17, 1983.

Address reprint requests to Dr. Demczuk.

Key words: Anesthetics, local: lidocaine. Complications: sinus bradycardia.