Cisapride does not alter gastric volume or pH in patients undergoing ambulatory surgery

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Purpose: To evaluate the efficacy of 20 mg cisapride *po* in reducing residual gastric volume and pH in adult ambulatory surgical patients.

Methods: Using a prospective randomised double-blind controlled design, we administered either 20 mg cisapride *po* or placebo preoperatively to 64 ASA 1-2 ambulatory surgical patients. Following induction of anesthesia we measured volume and pH of residual gastric contents, using blind aspiration through an orogastric tube. Parametric data were analysed using unpaired, one tail Students' t test. Non-parametric data were analysed using Fishers Exact test and Chi square analysis. Statistical significance was accepted at the probability level of < 0.05.

Results: Residual gastric volumes were similar in the two groups (19.5 ±23.8, 23.9 ± 24.4 ml), in the cisapride and placebo groups respectively, $P=0.24$). Data shown are mean (± SD). The proportions of patients with a residual gastric volume exceeding 0.4 $ml \cdot kg^{-1}$ were similar in the two groups (4 of 28, and 8 of 23 patients in the cisapride and placebo groups respectively, $P=0.09$). The pH of the residual gastric contents were similar in the cisapride and placebo groups (1.6 ± 0.5, 1.4 ± 0.5, respectively, $P=0.26$). The proportions of patients with pH < 2.5 was also similar in the cisapride and placebo groups (21 of 25, and 20 of 21 patients respectively, $P=0.2$).

Conclusions: Preoperative administration of 20 mg cisapride *po* to patients scheduled for outpatient surgery does not alter either the volume or the pH of gastric contents. Its use in this setting is of no apparent clinical benefit.

Objectif : Déterminer l'efficacité de l'administration *po* de 20 mg de cisapride dans la réduction du volume gastrique résiduel et du pH chez des patients adultes admis en chirurgie ambulatoire.

Méthode : C'est un modèle prospectif, randomisé, contrôlé et à double insu qui a servi à l'administration préopératoire, soit de 20 mg de cisapride *po*, soit d'un placebo, chez 64 patients ASA 1-2 de chirurgie ambulatoire. Après l'induction de l'anesthésie, on a mesuré le volume et le pH du contenu gastrique résiduel aspiré à l'aveugle au moyen d'un tube orogastrique. Les données paramétriques ont été analysées au moyen d'un test t unilatéral de Student pour séries non appariées. Les données non paramétriques l'ont été par le test exact de Fisher et l'analyse du Chi^2. Le seuil de signification statistique a été accepté à un niveau de probabilité $< 0,05$.

Résultats : Les volumes gastriques résiduels ont été similaires chez les patients des deux groupes (19,5 ± 23,8; 23,9 ± 24,4 ml) cisapride et placebo, respectivement, $P = 0,24$). Les données représentent la moyenne ± l'écart type. La proportion de patients ayant un volume gastrique résiduel plus grand que 0,4 $ml \cdot kg^{-1}$ a été semblable dans les deux groupes (4 sur 28, et 8 sur 23 patients dans les groupes cisapride et placebo respectivement, $P = 0,09$). Le pH du contenu gastrique résiduel a été similaire dans les deux groupes, cisapride et placebo (1,6 ± 0,5; 1,4 ± 0,5 respectivement, $P = 0,26$). La proportion de patients qui présentaient un pH $< 2,5$ était aussi similaire dans les groupes cisapride et placebo (21 sur 25 et 20 sur 21 patients, respectivement, $P = 0,2$).

Conclusion : L'administration préopératoire de 20 mg de cisapride *po* à des patients de chirurgie ambulatoire n'a pas eu d'effet sur le volume ou le pH du contenu gastrique. Son usage dans les circonstances ne présentait pas d'avantage clinique apparent.

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PREOPERATIVE volumes of gastric contents are greater in outpatients (69 ± 17 ml) than in inpatients (33 ± 4 ml),[1] potentially increasing the risk of pulmonary aspiration of gastric contents during general anesthesia.

Cisapride increases the rate of gastric emptying.[2] It is hypothesised that cisapride administered orally will minimise residual gastric volumes in ambulatory surgical patients.

We evaluated the efficacy of 20 mg cisapride *po* in reducing residual gastric volume and pH in adults prior to ambulatory surgery.

Methods

With institutional ethics approval and written informed consent, 64 fasting, unpremedicated ASA 1-2 ambulatory surgical patients were studied. Exclusion criteria were gastrointestinal pathology, diabetes mellitus, previous gastric or duodenal surgery, recent (one month) surgery, medication influencing gastric emptying, pregnancy, and body mass index exceeding 35 kgm^{-2}. Preoperatively, after eight hours fasting, each subject was randomly allocated, in a double blind manner, to receive either cisapride or placebo *po*. Heart rate and blood pressure (Datex AS3, Datex-Engstrom Ltd, Helsinki, Finland)(in all patients) and electrocardiographic QT interval corrected for heart rate (QTc)(in 22 patients) were recorded on two occasions, 1) immediately before cisapride administration, and 2) prior to induction of anesthesia.

Residual gastric volume was measured using serial intubation and aspiration.[3] Immediately after induction of anesthesia and tracheal intubation, a multiorificed polyvinyl orogastric tube size 21F (Vygon, Ecouen, France) was inserted to a depth of 60 cm from the incisors, and correct position verified by insufflation of air and auscultation. The patient was turned onto the right, then left side, then into the Trendelenburg and reverse Trendelenburg positions to 30° to the horizontal, aspirating the orogastric tube after each change in position. The orogastric tube was withdrawn under intermittent suction, collecting all aspirated fluid. The procedure was repeated, and the aspirate volume and pH recorded. The gastric aspirate pH was measured using an automated meter (Basic pH Meter 09339, Denver Instrument Company, USA); those patients in whom no gastric aspirate was obtained were excluded.

The incidence of nausea, vomiting, abdominal pain and diarrhea were assessed by questioning the patients 30 min, two hours and 24 hr after drug administration. Patients under general anesthesia were excluded from the questionnaire for that time point.

Based on $\alpha = 0.05$, and $ß = 0.2$, the minimum sample size required to detect a reduction in proportion of patients with a residual gastric volume >25 ml and pH <2.5 from 32%[4] to 5% is 25 per group. Parametric data were analysed using unpaired, one tail Students' t test. Non-parametric data were analysed using the Chi square and Fisher's Exact test. Statistical significance was accepted at the probability level of < 0.05.

Results

Sixty-four patients were recruited to the study. Induction of anesthesia occurred more than 180 min after drug administration in eight patients, one admitted to eating, one received ranitidine, and three withdrew. These 13 patients were excluded, and data obtained from 51 patients. The two groups were similar in terms of sex, body mass index (BMI), type of surgical procedure, and interval between drug administration and gastric aspiration. The cisapride group was older than the placebo group (P=0.04) (Table I).

Residual gastric volumes and the proportions of patients with a residual gastric volume >0.4 $ml \cdot kg^{-1}$ were similar in the two groups. The pH of the gastric

TABLE I Comparison of patient characteristics, interval between drug administration and gastric aspiration and types of surgical procedure in patients receiving cisapride and placebo. Data are mean (SD) or range [ ].

	Cisapride (n=28)	*Placebo (n=23)*	*P value*
Age (yr)	32.7 ± 11.82	28.8 ± 8.74	0.04
Body mass index ($kg \cdot m^{-2}$)	25.3 ± 4.25	25.0 ± 4.07	0.63
Sex (m/f)	10/18	14/8	0.09
Drug administration-gastric aspiration interval (min)	98.7 ± 35.7 [35-245]	97.6 ± 41.4 [43-180]	0.92
Type of surgical Procedure:			
Dental	15	11	
Gynecological	5	3	
Orthopedic	1	3	
Abdominal laparoscopy	2	0	
Limb /plastic	4	6	

TABLE II Gastric aspirate volume and pH in patients receiving cisapride and placebo. Data are mean (SD) and range [ ].

	Cisapride (n=28)	*Placebo (n=23)*	*P value*
Volume (ml)	19.5 ± 23.8 [0-115]	23.9 ± 24.4 [0-89]	0.24
pH	1.6 ± 0.5	1.4 ± 0.5	0.26
Number of patients with volume > 0.4 $ml \cdot kg^{-1}$	4	8	0.09
Number of patients with pH < 2.5	21 (n=25)	20 (n=21)	0.2

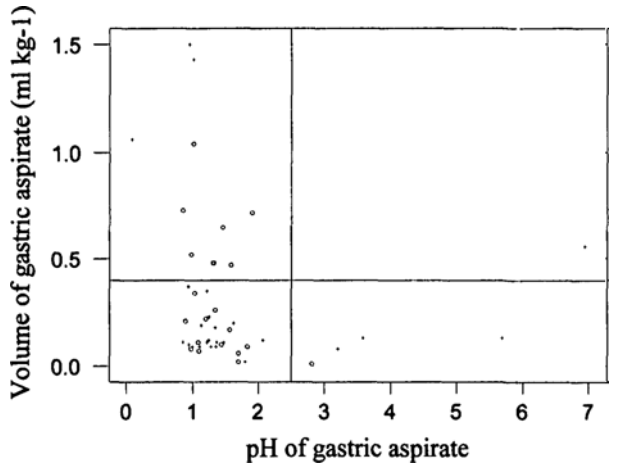

FIGURE Volume and pH of gastric aspirate in patients receiving cisapride (+) or placebo (o) with reference to critical thresholds for volume (0.4 ml·kg^{-1}) and pH (2.5).

aspirate and the proportions of patients with pH <2.5 were similar in both groups (Table II)(Figure).

At induction of anesthesia the magnitude of the changes in heart rate and mean arterial blood pressure were similar in the two groups (P=0.97 and P=0.87, respectively). The QTc was recorded in 10 and 12 patients receiving cisapride and placebo respectively, and remained normal in all recorded cases.

In the cisapride and placebo groups, the total number of complaints of nausea (7 and 0 respectively) was greater in the cisapride group (P=0.01); vomiting (2 and 1 respectively), diarrhea (1 and 0 respectively), and abdominal pain (2 and 0 respectively) was similar in the two groups.

Discussion

Our results indicate that cisapride administered *po* 37-180 min before surgery is ineffective in reducing the number of patients across the critical thresholds[5] of gastric content volume >0.4 ml·kg^{-1} or pH <2.5.

We administered 20 mg cisapride as this dose,[6] but not 10 mg,[7] reduced fasting residual gastric volume in surgical inpatients. The drug administration/measurement interval ranged from 37-180 min. In a previous study, with an administration/measurement interval of 45-270 min, cisapride reduced residual gastric volume.[6] A premedicant with a rapid onset of action is desirable as the time interval between hospital admission and induction of anesthesia is often brief. Plasma concentrations of cisapride peak one to two hours after oral administration.[2] Mean gastric volume was 23.9 ± 24.4 ml in the placebo group, consistent with previously reported residual gastric volumes of 20-30 ml[8] (Table II). This is lower than the residual gastric volumes of 69 ± 17 ml in surgical outpatients obtained using gastric aspiration under direct vision.[1] Blind aspiration may have underestimated residual gastric volume.[9] The cisapride group was older than the placebo group (P=0.04)(Table I). Although smaller residual gastric volumes occur in the elderly,[8] there is no evidence that residual gastric volumes decrease with age over the age range of our study patients.[8] Gastric aspirate pH was similar in the two groups, and less than the critical value of 2.5. Cisapride does not alter the normal composition of gastric secretions.[2] The incidence of diarrhea and abdominal cramps (adverse effects of cisapride) was similar in both groups. Isolated cases of QTc interval prolongation have been reported following cisapride administration.[10] The QTc interval remained normal in all recorded cases. The incidence of postoperative nausea was greater in the cisapride group (P=0.01). Cisapride decreases postprandial but not postoperative nausea.[2]

We cannot recommend routine oral administration of cisapride (20 mg) prior to ambulatory surgery, as our results indicate no effect on either the volume or the pH of gastric contents.

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References

1 *Ong BY, Palahnuik RJ, Cumming M.* Gastric volume and pH in out-patients. Can Anaesth Soc J 1978; 25: 36–9.

2 *Wiseman LR, Faulds D.* Cisapride. An updated review of its pharmacology and therapeutic efficacy as a prokinetic agent in gastrointestinal motility disorders. Drugs 1994; 47: 116–52.

3 *Hardy J-F, Plourde G, Lebrun M, Côté C, Dubé S, Lepage Y.* Determining gastric contents under general anaesthesia: evaluation of two methods. Can J Anaesth 1987; 34: 474–7.

4 *Haavik PE, Søreide E, Hofstad B, Steen PA.* Does preoperative anxiety influence gastric fluid volume and acidity? Anesth Analg 1992; 75: 91–4.

5 *Roberts RB, Shirley MA.* Reducing the risk of acid aspiration during Cesarian section. Anesth Analg 1974; 53: 859–68.

6 *Kluger MT, Owen H, Plummer JL, McLean C.* The effect of oral cisapride premedication on fasting gastric volumes. Anaesth Intensive Care 1995; 23: 687–90.

7 *Reissell E, Taskinen M-R, Orko R, Lindgren L.* Increased volume of gastric contents in diabetic patients undergo-

ing renal transplantation: lack of effect with cisapride. Acta Anaesthesiol Scand 1992; 36: 736–40.

8 *Manchikanti I, Colliver JA, Marrero TC, Roush JR.* Assessment of age-related acid aspiration risk factors in pediatric, adult, and geriatric patients. Anesth Analg 1985; 64: 11–7.

9 *Taylor WJ, Champion MC, Barry AW, Hurtig JB.* Measuring gastric contents during general anaesthesia: evaluation of blind gastric aspiration. Can J Anaesth 1989; 36: 51–4.

10 *Olsson S, Edwards IR.* Tachycardia during cisapride treatment. BMJ 1992; 305: 748–9.