

## SHORT COMMUNICATIONS

## Gastric emptying is delayed at 8-12 weeks' gestation

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## SUMMARY

Gastric emptying was studied indirectly by paracetamol absorption in 20 patients at 8-12 weeks' gestation and also in 20 non-pregnant controls. Subjects received paracetamol 1.5 g in a tablet with 50 ml of water and remained semi-recumbent for 2 h while venous blood samples were obtained at 15-min intervals. The maximum concentration of paracetamol was significantly lower and the time to maximum concentration significantly greater in pregnant patients. In addition, the areas under the time-concentration curves at 60 and 120 min were significantly smaller in the pregnant group. These changes are indicative of a delay in gastric emptying at 8-12 weeks' gestation. (Br. J. Anaesth. 1994; 73: 237-238)

## KEY WORDS

Gastrointestinal tract: emptying Pregnancy.

Regurgitation and pulmonary aspiration of gastric contents are a major hazard of anaesthesia. Delayed gastric emptying is considered a significant risk factor. A previous study from this department [1] compared the rate of gastric emptying in the three trimesters of pregnancy with non-pregnant controls. The paracetamol absorption method was used; this has been validated against scintigraphy of a non-absorbable ionic marker [2]. The only statistically significant differences were between the respective areas under the paracetamol time-concentration curves at 60 min ( $AUC_{60}$ ) and 120 min ( $AUC_{120}$ ) for patients in the first trimester of pregnancy and non-pregnant controls. The present study was designed to re-examine these two groups with a larger number of subjects. The power of the study was increased such that there was a 90% chance of detecting a 30-min increase in time to maximum concentration of paracetamol ( $tC_{pmax}$ ).

## METHODS AND RESULTS

Local Ethics Committee approval was granted and written informed consent obtained from 20 patients admitted for suction termination of pregnancy and 20 non-pregnant patients awaiting minor gynaecological procedures. Gestation was between 8 and 12 weeks, determined by clinical examination and ultrasound, in accordance with the individual prac-

tice of the gynaecologist. The subjects had no history of gastrointestinal disease and were not receiving medication known to affect gastric emptying. All were fasted for at least 4 h and remained semi-recumbent in bed throughout the study. An i.v. cannula was inserted and a baseline blood sample aspirated before paracetamol 1.5 g (three Sterling Winthrop 0.5-g tablets) was administered orally with 50 ml of water. Additional venous samples were obtained at 15-min intervals for 2 h. The plasma was separated and stored at  $-20^{\circ}\text{C}$  for subsequent measurement of plasma concentration of paracetamol by high pressure liquid chromatography. Details of the technique have been described in a previous study [1]. The lower limit of detection was  $0.3\ \mu\text{g ml}^{-1}$  with coefficients of variation of 3.5% and 1.7% within and between assays, respectively. From the serial samples the maximum concentration of paracetamol ( $C_{pmax}$ ) and  $tC_{pmax}$  were established for each patient and  $AUC_{60}$  and  $AUC_{120}$  calculated by the trapezoidal rule. Data were compared by analysis of variance (ANOVA). The power of the present study was calculated to be 90% for detecting a 30-min increase in  $tC_{pmax}$  and 85% for detecting a  $500\text{-}\mu\text{g ml}^{-1}\text{ min}$  decrease in  $AUC_{60}$ .  $P < 0.05$  was regarded as significant.

Mean age of the pregnant patients was significantly younger than the controls (table I), although the ranges were identical (17-40 yr). Mean weights were comparable. There were significant differences between the two groups in all measured pharmacokinetic correlates of gastric emptying [2]:  $C_{pmax}$ ,  $tC_{pmax}$ ,  $AUC_{60}$  and  $AUC_{120}$ .

TABLE I. Patient characteristics (mean (range)) and pharmacokinetic variables (mean (SD)). \* $P < 0.05$ ; \*\* $P < 0.005$  between groups

	Control group (n = 20)	Pregnant group (n = 20)
Weight (kg)	61.1 (45-86)	62.8 (47-85)
Age (yr)	30.0 (17-40)	24.4 (17-40) *
$C_{pmax}$ ( $\mu\text{g ml}^{-1}$ )	29.9 (11.5)	23.3 (7.5) *
$tC_{pmax}$ (min)	48.0 (28.2)	69.0 (29.0) *
$AUC_{60}$ ( $\mu\text{g ml}^{-1}\text{ min}$ )	1074.7 (533.6)	635.7 (329.6) **
$AUC_{120}$ ( $\mu\text{g ml}^{-1}\text{ min}$ )	2275.1 (742.5)	1171.8 (513.5) *

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## COMMENT

These results have corroborated the findings of the original study [1] with regard to gastric emptying in patients presenting for first trimester termination of pregnancy. However, they contradict the conclusion of a similar study [3] in which no differences were found between 32 non-pregnant controls and 18 patients of 8–10 weeks' gestation. In contrast, an earlier study of first trimester patients [4] demonstrated a significant delay in the absorption of paracetamol in patients of 12–14 weeks' gestation. The values for 8–11 weeks were between those of the control and the 12–14-week groups; the differences did not reach statistical significance. The pregnant patients in our study were awaiting terminations and the possible influence of preoperative anxiety in this group must be considered. However, comparison of anxiety levels between this group and patients awaiting diagnostic curettage would require objective assessment of anxiety scores. The variation in gastric emptying within the first trimester awaits clarification. Future studies should include objective, accurate assessment of gestational age by ultrasonography [5].

The clinical significance of the findings of the present study is uncertain. The differences were considerably smaller than those between subjects studied after opioid analgesics and controls [2]. The incidence of gastro-oesophageal reflux and regurgitation has been measured during anaesthesia for termination of first and second trimester pregnancies [6]. One patient in 50 in each group had evidence of otherwise silent regurgitation which occurred after hiccup. There were no sequelae and on review of the literature it was concluded that the incidence was no higher than in non-pregnant patients.

It is unclear why gastric emptying should be delayed in the first trimester of pregnancy and not subsequently. The relationships between symptoms of nausea and vomiting, hormonal changes and delayed gastric emptying in early pregnancy have yet to be defined. It is unlikely that the difference in ages between the two groups in the present study influenced the results.

In conclusion, in this group of patients, gastric emptying measured indirectly by paracetamol absorption was delayed at 8–12 weeks' gestation. It is reasonable to infer that the duration of fasting before anaesthesia should not be compromised for patients in the first trimester of pregnancy. In addition, delay might be expected in the absorption of orally administered drugs in the perioperative period.

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