We believe that aspiration of food particles is hazardous even when the pH is > 2.5. Wynne and associates (1979) demonstrated that the aspiration of particulate gastric contents at a pH of 4.3 was associated with severe lung injury. Moran (1951) found the pathological changes caused by non-acidic ground food aspiration in the guinea pig to be identical to food aspiration pneumonia in man. Schwartz and co-workers (1980) add further support to this contention by demonstrating that aspiration of gastric contents with a pH of 5.9 was associated with changes consistent with pneumonitis. These findings on particulate matter may contradict the classic findings on Mendelson's syndrome (Mendelson, 1946).

Miller's study does not examine the effect of a light breakfast on the amount of particulate matter in the stomach. The discomfort involved in fasting seems insignificant compared with the risks incurred by aspiration of foods.

Aspiration of particulate matter clearly can be associated with severe morbidity and should be avoided. We therefore encourage the continued practice of fasting patients for at least 4 h before elective surgery.

M. Sosis
M. Goldberg
Philadelphia

REFERENCES


Sir,—Thank you for allowing me to comment on the letter from Drs Goldberg and Sosis. Although I do not wish to reply specifically to the points raised in their letter, I would take issue with the last sentence of their first paragraph. I would point out to your readers that we did not imply that a pH of 3.0 is safe when one is discussing aspiration of gastric contents.

W. S. Nimmo
Sheffield

PARACETAMOL KINETICS AND GASTRIC EMPTYING

Sir,—We are investigating immediate post-partum gastric function and the influence of metoclopramide on it, using paracetamol absorption kinetics as a measure of gastric emptying (Heading et al., 1973, Clements et al., 1978; Nimmo, 1978). Murphy and colleagues (1984) describe the effects of metoclopramide on gastric emptying in pregnant patients also using paracetamol absorption as a marker. Their application of this useful method is, however, suspect.

Nimmo and colleagues (1975) demonstrated a correlation coefficient of 0.94 between the amount of paracetamol absorbed over 1 h (i.e. area under the plasma concentration curve after 1 h) and gastric emptying. A single sample at a fixed time, as used by Murphy and colleagues (1984) cannot be an accurate reflection of the amount absorbed, as one has no knowledge of curve profiles. Rapid absorption (or emptying) could result in a sampling during the downstroke of the curve and slow absorption (or emptying) during the upstroke. Comparisons of results obtained by single "spot" sampling are therefore invalid.

The influence of metoclopramide on gastric emptying in the presence of opioids remains unclear and deserves further study.

B. A. Finnegan
C. A. Jyn
Saskatoon

REFERENCES


Sir,—Thank you for allowing us the opportunity to reply to Drs Finnegan and Jyn who take issue with the methodology used in our study of gastric emptying in pregnant patients.

In the original work, Heading and colleagues (1973) related the rate of gastric emptying, as measured by a sequential scintiscanning technique, to paracetamol absorption. In all cases, peak plasma paracetamol concentrations are quoted and not "area under curve" (AUC) estimations. These results showed that "there were (also) statistically significant correlations between the half-time of gastric emptying and the plasma concentration at 30 min and at 60 min." All subsequent studies by these authors (Nimmo et al., 1973; Nimmo, Wilson and Prescott, 1975; Nimmo et al., 1975; Nimmo, 1978; Wilson, 1978) quote mean peak plasma concentrations in their results. There is one reference to plasma concentration—time, area under curve estimation (figure 4, Nimmo et al., 1975) and it is assumed that it is in reference to this that Drs Finnegan and Jyn believe AUC estimations should be used.

For our study, we accepted the validity of the “paracetamol absorption” technique and used mean peak plasma paracetamol concentrations as an indirect index of the rate of gastric emptying. We do not, therefore, accept that the methodology used is invalid. It is possible that AUC estimations might be a better method of analysis, but would certainly be more difficult to undertake and control in labouring patients. In any event, it is our opinion that the plasma paracetamol
concentrations in our study were of such magnitude in the different subgroups as to withstand statistical evaluation by either method of assessment.

D. F. Murphy  
J. Gardiner  
Dublin

REFERENCES


ORAL RANITIDINE IN LABOUR

Sir,—Despite many improvements in obstetric anaesthesia, the inhalation of gastric contents remains an important cause of maternal mortality. Experimental work in animals (Mendelson, 1946; Teabeaut, 1952) suggests that Mendelson's syndrome is likely to occur when the pH of the inhaled material is below 2.5 and it is probable that the inhalation of a volume as small as 25 ml (Roberts and Shirley, 1974) may be fatal. The H₂-receptor antagonists appear an attractive method of increasing gastric pH. Ranitidine, because of its different chemical structure, appears to have less side-effects than cimetidine and has a longer duration of action. The purpose of this study was to determine whether the administration of ranitidine 150 mg by mouth at 8-hourly intervals to patients in induced labour would reliably increase gastric pH to a safe value.

Nine healthy patients receiving no medication and with no history of peptic ulceration before pregnancy were studied. All gave informed consent. All were admitted to hospital on the evening before the surgical induction of labour. At 22.00 h on the evening of admission, ranitidine 150 mg was given by mouth. Thereafter the same dose was given 8-hourly until delivery. Just before the induction of labour next morning, a size 8-French gauge nasogastric tube was passed. Five millilitres of gastric contents was aspirated. This was repeated every 2 h until the second stage of labour was reached. The patient's stomach was then emptied as far as possible, using the nasogastric tube, before delivery and the final volume of aspirate was measured. The pH of all samples of gastric aspirate was measured using a Corning EEL model 7 pH meter. Apgar scores were noted at 1 and 5 min after delivery. The babies were observed closely for 48 h after delivery for any feeding difficulties or jaundice. Maternal and fetal cord plasma aspirate was measured using a Coming EEL model 7 pH meter. Apgar scores were noted at 1 and 5 min after delivery. The babies were observed closely for 48 h after delivery for any feeding difficulties or jaundice. Samples of maternal and cord blood were taken just after delivery, and the plasma concentrations of ranitidine measured.

When the serial pH values for each of the nine patients were reviewed (table I) it was noted that one patient (No. 5) had an unacceptably low pH value (below 3.0) at induction and in early labour but an acceptable pH value (4.8) at delivery. Several other unacceptably low pH values were obtained. One of these was at delivery (patient No. 9). These low pH values all occurred 1 h before or after ranitidine administration. Mean pH measurements (i.e. the mean of all the pH values taken at one time) were consistently at their highest 5 h after ranitidine administration and thereafter decreased until subsequent doses became effective (fig. 1). Gastric volumes ranged from 20 to 45 ml (mean 30 ml). The mean Apgar scores at 1 and 5 min were 9 and 10, respectively. No baby developed respiratory or feeding difficulties or jaundice. Maternal and fetal cord plasma ranitidine concentrations showed a wide variation (36-430 ng ml⁻¹ and 40-260 ng ml⁻¹ respectively). The mean fetal:maternal ratio of plasma ranitidine was 0.7, showing that ranitidine crosses the placenta in significant amounts. Five of the patients

### Table I. Table of serial gastric pH values in nine patients during labour.

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Time (h)</th>
<th>R</th>
<th>5.00</th>
<th>11.00</th>
<th>13.00</th>
<th>15.00</th>
<th>17.00</th>
<th>19.00</th>
<th>21.00</th>
<th>R</th>
<th>23.00</th>
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<td>5.8</td>
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R = ranitidine given. Values < 3 are in bold type.