EFFECT OF METOCLOPRAMIDE ON GASTRIC EMPTYING BEFORE ELECTIVE AND EMERGENCY CAESAREAN SECTION

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SUMMARY

The effect on gastric emptying of metoclopramide i.v. was studied in three groups of parturient women (n = 120). The groups included those undergoing elective Caesarean section, those who had been in established labour, and those who had received narcotics while in established labour, with their respective controls. Significant delay in gastric emptying occurred when labour was established. This delay was further prolonged by the administration of a narcotic. Metoclopramide i.v. produced a significant improvement in gastric emptying in all groups.

Emergency anaesthesia, for whatever reason, entails considerable risks to the patient, the greatest of which, and one which carries a significant mortality, being the danger of regurgitation and the aspiration of gastric contents during the induction of anaesthesia.

In pregnancy, and particularly in labour (Davison, Davison and Hay, 1970), gastric emptying is known to be delayed and these women must be considered as high-risk patients in this respect, if general anaesthesia proves necessary. Apart from the effect of labour on gastric emptying, many patients are given opiate analgesia in labour and this has been shown to delay gastric emptying further (Nimmo, Wilson and Prescott, 1975).

Metoclopramide (Maxolon) is a chlorbenzamide derivative which is known to increase the rate of gastric emptying in the non-pregnant patient (Hewells et al., 1971; Nimmo et al., 1973). Howard and Sharp (1973) found that, in labour, the rate of gastric emptying could be improved following the administration of metoclopramide i.m., but it is not clear whether this applied to all the patients studied, or just those who received no opiates. Wilson (1978) has suggested that gastric emptying is not improved with metoclopramide when given with opiates.

This study was designed to isolate the variables known to affect gastric emptying in pregnancy, and to study the effects of metoclopramide i.v. on gastric emptying in these situations. The study received the approval of the hospital Ethics committee, and informed consent was obtained from all the patients involved.

PATIENTS AND METHODS

One hundred and twenty patients were placed in three groups according to their obstetric management. The groups included: (a) those patients undergoing elective Caesarean section (n = 40); (b) those who had been in established labour but who had not received any opiate narcotic for pain relief (n = 40); and (c) those patients who had been in established labour and who had received an opiate narcotic before the administration of metoclopramide (n = 40). The patients were further divided randomly into sub-groups of 20 who received metoclopramide 10 mg i.v., and 20 who did not; the latter sub-groups acted as controls.

Labour was said to be established when the cervix uteri had dilated to 3 cm or greater. Those receiving opiate analgesia were given pethidine 50 mg i.m., since this is the standard drug used at this hospital. Any patient receiving extradural analgesia was excluded from the trial.

Oral antacids were given immediately before the induction of anaesthesia, and consisted of aluminium hydroxide 30 ml which was taken within 10 min of the induction of anaesthesia. Antacids were not given at any other time.

All patients had fasted for a minimum of 2 h before admission to the study.

Gastric emptying was measured indirectly by the method described by Nimmo (1978). Each patient was given paracetamol (Panadol) 1.5 g orally with 200 ml of water, and a venous blood sample was...
taken 1 h later. The plasma was extracted, frozen and analysed subsequently for paracetamol concentration using gas–liquid chromatography as described by Prescott (1971). Nimmo and colleagues have shown that "there is a very high correlation between the amount emptied from the stomach at 1 hour and the amount of paracetamol absorbed at 1 hour" (Nimmo, 1978) with a correlation coefficient of 0.94 (Nimmo et al., 1975). Pharmacokinetic analysis by Clements and colleagues (1978) on paracetamol absorption has confirmed this finding.

Metoclopramide, when given, was administered as 10 mg bolus i.v. at the same time as the paracetamol.

The results were analysed using an analysis of variance, and justified by inspection of the residual normal plot.

RESULTS
Group characteristics of the patients included in the study are shown in table I.

Effect of labour and narcotic administration on gastric emptying
The effect of labour on gastric emptying was studied by comparing the results of those who underwent elective Caesarean section with those who had been in established labour.

The effect of narcotic administration was studied by comparing those in established labour given placebo with those who were given the narcotic.

Both the effect of labour and the effect of narcotic administration in labour were found to be significant (P<0.005) when compared with their respective control groups.

Effect of metoclopramide on gastric emptying
By comparing the results of the three patient subgroups given placebo with their respective subgroups given metoclopramide, the effect of metoclopramide was determined (table II). The effect was the same for all groups (P>0.8). A significant (P<0.002) increase in gastric emptying occurred with metoclopramide administration in all three subgroups.

DISCUSSION
Apart from increased intragastric pressure resulting from the gravid uterus predisposing to passive regurgitation (Brock-Utne et al., 1978), gastric emptying is delayed in labour, and particularly after opiate administration. Standard policy before Caesarean section is to administer oral antacids before the induction of anaesthesia based on the findings of Taylor and Pryse-Davies (1966) so as to decrease the acidity of the gastric contents. Attempts at increasing the rate of gastric emptying are not standard practice. It would seem logical that decreases in the volume of the gastric contents should increase the neutralizing power of the preinduction oral antacids, apart from emptying the stomach per se.

Our study confirmed that delay in gastric emptying occurred in labour, but that this delay could be countered by the administration of metoclopramide i.v. These findings are in agreement with those of Howard and Sharp (1973), who found a significant improvement (P<0.005) in gastric emptying at 20 min following metoclopramide i.m. It is assumed that an even more rapid effect would be found.

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<th>Table I. Characteristics of patients</th>
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<td>Mean age (yr)</td>
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<td>Duration of labour/ mean cervical dilatation (cm) before paracetamol admin.</td>
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<td>Time (min) from admin. of narcotic to paracetamol admin.</td>
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GASTRIC EMPTYING AFTER METOCLOPRAMIDE

following an injection i.v., but no attempt to measure the speed of action of metoclopramide i.v. was made.

Our results showed that pethidine, even in a dose of 50 mg i.m., caused significant slowing of gastric emptying, confirming the results of Nimmo, Wilson and Prescott (1975) but, in contrast to these authors' results, we found that a significant improvement could be achieved with metoclopramide i.v. It is not entirely clear why this discrepancy occurred, but there exist a number of important differences between the two studies. First, in their study, Nimmo, Wilson and Prescott (1975) gave much larger doses of pethidine and this alone may account for the difference. Furthermore, these authors gave metoclopramide i.m. whereas, to maximize its effect, we gave the drug i.v. A third area of difference was in the timing of the drug administrations. Nimmo, Wilson and Prescott (1975) gave the pethidine and metoclopramide simultaneously so that the effect on gastric emptying depended on the relative rates of absorption of the individual drugs. This was not the case in our study, since we allowed sufficient time for the pethidine to affect the rate of gastric emptying before attempting to antagonize this effect with metoclopramide. The authors consider this to simulate more closely the likely clinical situation. However, there was a difference between the two subgroups receiving pethidine with respect to the timing of the administration of the paracetamol (table I). Nevertheless, this was unlikely to affect the results significantly, since the effect of the pethidine on gastric emptying remained constant over this period.

A factor not studied here, but one which would also recommend metoclopramide for routine administration, is its effect on the lower oesophageal sphincter (LOS). Brock-Utne and co-workers (1978) have shown that lower oesophageal sphincter tone could be increased in late pregnancy by metoclopramide. In addition, they demonstrated that it could reverse the relaxant effects of atropine on the LOS (Brock-Utne et al., 1976). Hey and colleagues (1981) showed that metoclopramide i.v. countered the relaxant effects of pethidine on LOS tone within 5 min of its administration.

On the basis of our results, a significant improvement in gastric emptying occurred in all patients undergoing Caesarean section following the administration of metoclopramide i.v.

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REFERENCES


**WIRKUNG VON METOCLOPRAMID AUF DIE MAGENENTLEERUNG VOR ELEKTIVEM UND NOTFALLMÄßIGEM KAISERSCHNITT**

**ZUSAMMENFASSUNG**


**EFFETS DU METOCLOPRAMIDE SUR LA VIDANGE GASTRIQUE AVANT CESARIENNE REGLEE OU EN URGENCE**

**RESUME**

Les effets du metoclopramide i.v. sur la vidange gastrique ont été étudiés chez trois groupes de parturientes. Les groupes comportaient des femmes devant subir une césarienne réglée, des femmes ayant eu un travail bien avancé et des femmes qui avaient reçu des morphinomimétiques au cours de leur travail avec pour chaque groupe des sujets contrôles. Lorsque le travail était bien établi, la vidange gastrique était significativement retardée. Ce retard était encore aggravé par l'administration d'un morphinomimétique. Le metoclopramide i.v. produisait une amélioration significative de la vidange gastrique dans tous les groupes.

**EFECTO DE LA METOCLOPRAMIDA SOBRE EL VACIAMIENTO GÁSTORICO ANTES DE UNA OPERACION CESAREA ELECTIVA DE EMERGENCIA**

**SUMARIO**

Se estudió el efecto sobre el vaciamiento gástrico de la metoclopramida i.v. en tres grupos de parturientas (n = 120). Los grupos incluían las que estaban por someterse a una operación cesárea electiva, las que se encontraban en parto normal y las que habían recibido narcóticos mientras se establecía el paro con sus controles respectivos. Tuvo lugar una demora significante del vaciamiento gástrico cuando se establecía el paro. Esta demora se prolongó más aún cuando se administraron narcóticos. La metoclopramida i.v. produjo una mejoría significante del vaciamiento gástrico en todos los grupos.