

Gastric emptying procedures in the self-poisoned patient: are we forcing gastric content beyond the pylorus?

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Summary

A prospective, randomized, single-blind study was carried out to determine whether gastric content is forced into the small bowel when gastric-emptying procedures are employed in self-poisoned patients. They were asked to swallow barium-impregnated polythene pellets, immediately prior to either gastric lavage or ipecacuanha-induced emesis. A second group of patients, who did not require treatment, were used as controls. Sixty patients were recruited to the study. The data show a significant difference in the number of residual pellets in the small bowel of the treated group ($n=40$), when compared with the control group ($P<0.0001$). There was no statistical difference in the number of pellets in the small bowel when the treated groups were compared with each other. In addition, the inefficiency of gastric-emptying procedures is highlighted; 58.5% of the total number of pellets ingested were retained in the gastrointestinal tract of the ipecacuanha-treated group, while 51.8% of total pellets ingested were retained in the gastric lavage-treated group.

Introduction

The value and effectiveness of gastric decontaminating procedures have been doubted by several authorities over the years¹⁻³. There is controversy in the medical literature concerning the efficiency of gastric emptying procedures, and which, if any, is more useful⁴⁻⁶.

Significant residual quantities of the markers sucralfate and cyanocobalamin have been demonstrated in ipecacuanha-treated patients^{7,8}. Large residues of food and tablets have been demonstrated endoscopically after both techniques of emptying⁹. Curtis *et al.*¹⁰ have demonstrated superiority using activated charcoal when compared with gastric lavage and ipecacuanha-induced emesis.

It is theoretically possible that the use of gastric-emptying procedures may force gastric content into the small intestine. Therefore, we decided to study the fate of radio-opaque polythene pellets in self-poisoned patients, in order to assess the effect of gastric-emptying procedures on gastric content.

Patients and methods

Self-poisoned patients, presenting to the A & E department of the Leicester Royal Infirmary, were recruited into this study. Following informed consent, they were asked to swallow 20 polythene pellets. Those thought medically to require gastric emptying were randomly allocated a gastric-emptying procedure, either gastric lavage or ipecacuanha-induced emesis.

The polythene pellets used were barium sulphate-impregnated cubes measuring 3 mm. Their specific

gravity has been determined to be 1.3. They do not clump when wet (cohesive forces are minimal), and are inert and insoluble. They therefore conform with a number of the ideal requirements of a tool of investigative study. They have been used in gastrointestinal transit-time studies¹¹.

The patients received routine emergency treatment for poison ingestion and also had a urine drug screen. Patients with a paracetamol or a salicylate overdose also had a plasma level estimation of the drug. The three categories of patients were as follows:

Control group

These patients did not require gastric decontamination. This was because of delayed presentation since their overdose or because the small quantity and type of drug ingested did not require gastric clearance. Ethically, it was felt unjustifiable to randomize this group with the main, treated, group. A plain abdominal X-ray was obtained after ingestion of the radio-opaque pellets (Figure 1).

Gastric lavage

This group were given the radio-opaque pellets to swallow and then immediately washed out, the method used being that described by Matthew and Lawson¹². A plain abdominal X-ray was obtained following the procedure.

Ipecacuanha-induced emesis

This group ingested the pellets with 30 ml syrup of ipecacuanha and liberal quantities of water. The

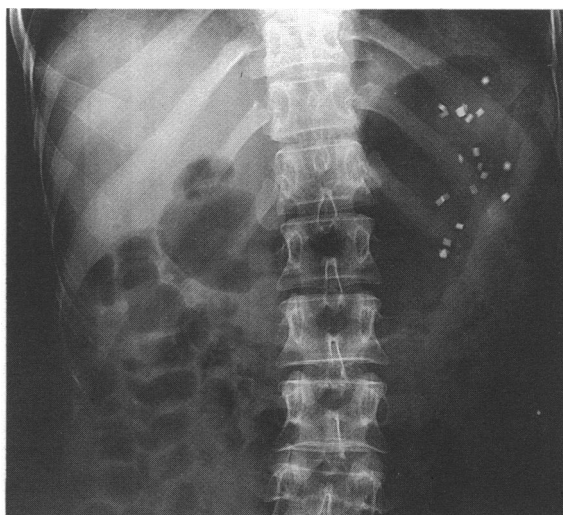


Figure 1. Plain abdominal X-ray of a control patient showing radio-opaque pellets all lying within the gastric shadow

patients stopped vomiting prior to obtaining a plain abdominal X-ray.

The number of residual pellets on X-ray were independently assessed by one of the authors (DNQ), who was unaware of the treatment received. The residual pellets seen on X-ray were counted and their distribution in the gastrointestinal tract determined.

The data was analysed by the method of logistic regression.

This study was approved for research by the local ethical committee.

Results

Sixty self-poisoned patients were recruited into the study; of these, 40 patients were randomized to receive either gastric lavage or induced emesis. The remaining patients, who did not require gastric decontamination, acted as controls. There were no statistically significant differences between the groups with regards to mean age and sex ratio.

Control group

Time lapse between ingestion of pellets and X-ray varied between 30 and 70 min (mean=43.5 min). Sixty-five (16.3%) pellets had been counted in the small bowel on X-ray (Table 1).

Gastric lavage group

The 20 patients in this group had their stomachs washed out with between 3.5 and 6 litres of tap water. The time elapsed between ingestion of pellets and X-ray varied between 10 and 90 min (mean=33 min). Two hundred and seven (51.8%) pellets ingested were retained. Of these, 69 (33.3%) were counted in the small intestine (Table 2).

Ipecacuanha-treated group

The patients started vomiting between 5 and 20 min after ingestion of syrup of ipecacuanha. The time elapsed between ingestion of the radio-opaque pellets and X-ray was 15-80 min (mean=47.2 min). 234 pellets (58.5%) were retained in the gastrointestinal tract, of which 92 (39.3%) were counted in the small intestine (Table 3).

Applying logistic regression analysis, there was a highly significant difference ($P < 0.0001$), between the control group and the two other, treated, groups, in numbers of residual pellets in the small bowel. When the treated groups were compared with one another, however, the numbers of residual pellets in the small bowel failed to reach a statistically significant difference.

Table 1. Control group. Residual pellets in 20 patients managed without a gastric-emptying procedure

Case No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
*Time lapse (min)	30	30	35	35	35	35	35	35	35	40	40	45	45	45	45	50	60	60	65	70
Pellets:																				
Stomach	20	11	20	20	16	15	20	20	7	20	20	8	20	20	19	20	16	16	14	13
Intestine	0	9	0	0	4	5	0	0	13	0	0	12	0	0	1	0	4	4	6	7

Age range: 18-85 years

Mean age: 33.4 years

M : F = 13 : 7

*Time difference between ingestion of pellets and X-ray

Table 2. Gastric lavage group. Stomach washout was started within 5 min of ingestion of pellets in all 20 patients

Case No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
*Time lapse (min)	10	15	20	25	25	25	30	30	30	30	30	30	30	30	30	35	40	45	60	90
Pellets:																				
Stomach	11	1	12	5	15	14	8	0	12	6	9	3	4	15	3	5	0	0	2	11
Intestine	9	3	4	15	3	5	0	0	2	11	0	0	0	0	7	5	9	0	0	0

Age range: 16-55 years

Mean age: 29.3 years

M : F = 9 : 11

*Time difference between ingestion of pellets and X-ray

Table 3. Induced emesis group. Patients swallowed the radio-opaque pellets with syrup of ipecacuanha and liberal fluids

Case No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
*Time lapse (min)	15	25	25	35	35	35	40	45	45	45	45	50	50	55	60	60	65	65	70	80
Pellets:																				
Stomach	1	1	1	16	0	2	12	0	8	9	11	19	3	9	7	15	13	1	7	7
Intestine	0	15	2	0	0	15	1	16	0	1	1	0	6	0	0	1	0	16	7	11

Age range: 16-59 years

Mean age: 28.7 years

M : F = 7 : 13

*Time difference between ingestion of pellets and X-ray

Discussion

Deliberate self-poisoning is a very common clinical problem facing clinicians in A & E departments. Most patients recover from the effects of their drug exposure.

Clinical outcome appears not to be influenced by gastric-emptying procedures in patients presenting more than an hour post ingestion¹³, and is probably more related to the expected toxicity of the drug ingested¹⁴. Vale *et al.*³ have suggested that the use of syrup of ipecacuanha in the routine management of self-poisoning be reconsidered, since there is no evidence that it prevents drug absorption or systemic toxicity.

This study demonstrates the inefficiency of gastric emptying methods and that, in addition, gastric content may be forced into the small bowel. If the ingested drug is subjected to the same forces as radio-opaque pellets used in this study during gastric emptying procedures, then the latter methods serve to increase the amount of drug available for small bowel absorption.

Neuvonen^{4,15,16}, has demonstrated significant reductions in the absorption of drugs such as paracetamol, phenobarbitone, aminophylline and carbamazepine, using orally administered, multiple-dose activated charcoal. Efforts at gastrointestinal decontamination in A & E departments should be directed towards research into drug-specific, orally administered, agents to neutralize the effect of drug which lies in the stomach. This avoids the problem of expelling free drug in the gastric lumen into the small bowel.

Finally, the clinician should weigh his decision carefully before prescribing a gastric emptying procedure that may be more harmful, psychologically and physically, than the effect of the overdose.

In summary, this study demonstrates that the physical forces generated both during gastric lavage and ipecacuanha-induced emesis, may cause gastric content to be discharged into the small bowel. These procedures may increase the amount of drug available for absorption by the gastrointestinal tract, and decrease the amount of drug available to specific gastrointestinal administered antidotes. More research should be aimed at improving the recovery, or decreasing the absorption, of ingested dangerous drug overdoses.

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