Clinical Topics

Clinitest ingestion

ANDREW MALLORY, JOHN W SCHAEFER

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Summary

Eight patients who had ingested Clinitest tablets were seen in one hospital over four years. Nineteen reported cases were also reviewed. Clinitest ingestion seems to be more common than was thought. Gastric lesions are common, though the frequency of serious sequelae has been overestimated in reports. Some features of Clinitest ingestion differ from those produced by ingesting other alkalis. These include a higher frequency of adult and accidental ingestion, a lower prevalence of pharyngeal lesions, and oesophageal strictures that tend to be more proximal, shorter, and earlier in onset. The incidence of accidental ingestion by adults would probably be reduced if other methods of testing urine were used in patients who are likely to misunderstand instructions or mistake the tablets for others and if Clinitest tablets could be made in a distinctive size and shape.

Introduction

Clinitest tablets are commonly used to detect urinary sugar by diabetic patients. These tablets contain copper sulphate, citric acid, anhydrous sodium hydroxide, and sodium carbonate. Sugar in the urine reduces cupric salts to cuprous oxide, resulting in a colour change that varies according to the quantity of sugar present. The sodium hydroxide provides the alkaline pH and, through its reaction with water and citric acid, the heat necessary for the reaction to take place. Reports have clearly shown that suicidal or accidental ingestion of these tablets can result in oesophageal and, occasionally, gastric burns.¹⁻¹⁴

Over four years we have seen eight adults who ingested Clinitest tablets. Because our experience has differed from that of others, we also reviewed all the other reported cases of Clinitest ingestion.

Present series

CASE REPORT

A 71-year-old Mexican diabetic woman with little understanding of English was switched from insulin to an oral hypoglycaemic agent and

told to test her urine twice a day with Clinitest tablets. One month later she was found to have swallowed 47 Clinitest tablets despite experiencing epigastric burning after each tablet. She denied vomiting, sore throat, odynophagia, or signs of gastrointestinal blood loss. Physical examination showed nothing remarkable except mild upper abdominal tenderness.

Fibreoptic endoscopy showed a normal oesophagus. A large white eschar replaced most of the mucosa of the proximal two-thirds of the stomach and erythematous gastritis was present elsewhere. Radiography showed a normal oesophagus, but a ragged, polypoid pattern replaced the normal gastric folds (see figure). The antrum and duodenum appeared normal.

Case 1. Initial barium study of stomach showing ragged pattern replacing normal rugal folds. Study was performed shortly after gastroscopy, when stomach was free of recently ingested food or excessive secretions.

The patient refused to be admitted to hospital. She was treated with frequent doses of antacid and remained clinically well. Gastroscopy repeated nine and 19 days later showed a progressive reduction in the size of the eschar and the intensity of the gastritis. Repeat radiographs showed the gradual reappearance of normal gastric folds. Six months later gastroscopy and radiography showed everything to be normal.

CHARACTERISTICS OF PATIENTS

Stimulated by this case we reviewed our recent experience with Clinitest ingestion. During 1973-6 seven other patients had been admitted to Denver General Hospital after ingesting these tablets. The clinical features of all eight patients are summarised in the table. Physical findings were usually unremarkable. One patient had mild erythema of the pharynx and several white plaques on the tongue; the other seven patients had normal oral and pharyngeal examinations.

Division of Gastroenterology, Department of Medicine, Denver General Hospital and University of Colorado School of Medicine, Denver, Colorado

ANDREW MALLORY, MD, assistant professor of medicine
JOHN W SCHAEFER, MD, chief of division and associate professor of medicine

All eight patients underwent prompt endoscopy. Three were examined with a rigid oesophagoscope, and acute mucosal burns of the oesophagus were found in two. The other five patients underwent fiberoptic endoscopy: in four the oesophagus was normal, but the stomach showed a moderate to severe gastritis with erythema, petechiae, and black-based erosions. One patient had a mild distal oesophagitis and normal stomach appearances. All eight patients recovered without strictures or other serious sequelae.

Other series and cases

Review of reported cases in English disclosed 19 patients who had ingested Clinitest tablets.¹⁻¹⁴ The clinical features of these patients are also shown in the table. Of the 15 patients from previous reports who had developed strictures four had developed them within a week of ingestion and six had developed them over three weeks later. The remaining five patients were children who could not give an accurate history.

Discussion

Our eight patients contributed in several ways to our understanding of the consequences of Clinitest ingestion.

Firstly, in four of the five patients in whom both the oesophagus and stomach were examined at endoscopy gastric lesions were more severe than oesophageal ones. None of the 19 patients previously reported underwent prompt endoscopic examination of both oesophagus and stomach, but three were examined at surgery or necropsy within two weeks of ingestion. In each case gastric lesions were present, and in two patients these were more severe than those of the oesophagus. These findings contradict the general belief that the constituents of Clinitest, like other strong alkalis, primarily attack the oesophagus and spare the stomach.^{5 8 12} This pattern may be explained by

the fact that Clinitest tablets are solid, need several seconds to dissolve, and are usually swallowed with water.

Secondly, none of our eight patients developed serious complications. By contrast, 18 of the 19 previously reported patients suffered significant sequelae, which probably illustrates a bias towards reporting severe cases.

Thirdly, the fact that we saw eight patients who had swallowed Clinitest tablets at a moderate-sized city hospital over four years suggests that Clinitest ingestion is more common than is indicated by the few case reports. The unexpected frequency of cases at our hospital may be an artefact of incomplete reporting by others, but it does suggest that the incidence of Clinitest ingestion may be increasing. This latter view is supported by the fact that during the four years under review only six patients were admitted to our hospital after ingesting other strong alkalis (Drano in four cases). In two earlier large reviews Clinitest accounted for only 3%^{15 16} of cases of alkali ingestion.

Review of all 27 cases suggests that several features of Clinitest ingestion differ from those associated with ingestion of other caustic agents. Firstly, unlike other strong alkalis, Clinitest tablets often seem to damage the stomach and spare the oesophagus. Secondly, about two-thirds of these patients were adults; other alkalis are taken mainly by children.^{17 18} Thirdly, adults take other alkalis mainly to commit suicide^{17 18}; most of the adults taking Clinitest tablets took them accidentally. Fourthly, in contrast to lye ingestion,¹⁶ pharyngeal burns are uncommon after Clinitest ingestion, probably because the solid nature of the pill usually allows complete passage into the oesophagus before the chemical reaction starts.⁵ And, fifthly, a comparison of the 15 oesophageal strictures due to Clinitest tablets with the oesophageal strictures resulting from other alkalis suggested that Clinitest strictures develop earlier^{17 19} and are more often single,^{15 18} shorter,²⁰ and more proximally located.¹⁵

Can anything be done to prevent the accidental ingestion of Clinitest tablets? Tablets are white with blue flecks and

Clinical features of patients who swallowed Clinitest tablets

Reference	Year	Age and sex	No ingested	Reason for ingestion	Symptoms		Serious sequelae (oesophageal unless specified)
					Early (≤24 h)	Late (>24 h)	
Bloomer and Kirchner ¹	1955	14 F	1	Mistook for aspirin	Pharyngeal and epigastric pain	Dysphagia at 3 days	2.5-cm stricture upper third
Lasky and Picard ²	1956	64 F	1	Mistook for aspirin	Substernal pain	Dysphagia at 14 days	6-mm stricture upper third
Canby ³	1957	3 M 2 M	? ?	Child Child	Vomiting Vomiting	Refused food, weight loss Dysphagia	Stricture upper third 3-mm stricture upper third
McFadden ⁴	1958	60 F	1	Mistook for Caroid	Epigastric pain	Dysphagia at 1 day	4-5 cm stricture at junction of upper and middle thirds
Tomsovic and Javid ⁵	1958	5 F	1	Child	Vomiting, pharyngeal and epigastric pain	Dysphagia at 14 days	1-cm stricture lower third
Jacobziner and Raybin ⁶	1959	44 F	1	Mistook for "pain pill"	Vomiting	?	No follow-up
Zimmerman ⁷	1959	4 F	1	Child	?	Vomiting, weight loss	6-mm stricture upper third
Rabinowitz and Tchang ⁸	1961	16 F	2	Mistook for aspirin	Substernal pain	Dysphagia at 10 days	1-cm stricture lower third
Burton and Zawadzki ⁹	1962	59 M	Many	Suicide	?		Laryngeal oedema, death
Danzig and Loebel ¹⁰	1965	34 M	2	Suicide	Substernal pain	Dysphagia within 14 days	Small stricture lower third
Cihak ¹¹	1969	Young man	Many	Suicide	?	?	Intestinal haemorrhage, perforation, death
Messersmith <i>et al</i> ¹²	1970	65 M	34	Suicide	Vomiting, diarrhoea, abdominal pain		Gastric perforation
Payten ¹³	1972	82 F	1	Mistook for aspirin	Substernal pain	Dysphagia at 21 days	Localised stricture upper third
Burrington ¹⁴	1975	2 M	1	Child	?	Fever, dysphagia at 1 day	3.5-cm stricture upper third
Present report	1977	2 M	1	Child	Pain in mouth	Dysphagia within 11 days	Short stricture upper third
		2 M	?	Child	?	Dysphagia at 3 days	Short stricture upper third
		1 F	1	Child	?	Dysphagia	Short stricture upper third
		2 M	1	Child	?	Dysphagia	Stricture upper third
		71 F	47	Misunderstanding	Epigastric pain after each ingestion		None
		43 F	5	Suicide	Substernal pain	Odynophagia for 48 hours	None
		41 F	1	Mistook for aspirin	Pharyngeal and substernal pain	Pharyngeal pain for 72 hours	None
		48 F	10	Suicide	Oropharyngeal pain	None	None
		52 M	2	Mistook for Tylenol	Substernal and epigastric pain	Odynophagia for 7 days	None
		17 M	2	Suicide	Vomiting	None	None
		28 M	10	Suicide	Mouth and epigastric pain, vomiting	Epigastric pain	None
		25 F	1	Mistook for another pill	Mouth and epigastric pain, nausea	None	None

resemble many oral medications in shape, being cylinders 11 mm in diameter and 3.5 mm in height. It is therefore not surprising that the inebriated or senile patient, the diabetic with impaired vision, or the patient attempting to take an oral medication in the dark might mistake these tablets for an oral medicine. If additional studies find that accidental ingestion of these pills is as common as our experience suggests, alternative methods of urine testing should be considered for patients who are likely to ingest these tablets accidentally—for example, alcoholic or senile patients or patients with visual or language problems, especially if they are taking many tablets. The manufacturer might also consider changing the size and shape of the tablets to lessen the likelihood of their being mistaken for oral medications.

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Medical Education

Role of self-instruction and self-testing in teaching pathology

ROBERT C CURRAN, E LYNN JONES

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There has been considerable discussion in recent years on the use of self-instructional techniques in medical education, with considerable divergences of opinion as to their long-term value. Since 1971 the introductory course in the principles of pathology (general pathology) at this medical school has been based on a series of tape-slide presentations, effectively linear "programmes," and our experience during these six years shows that this approach has considerable advantages that merit its wider adoption. We describe the way the programmes are used and how the rest of the course has been planned round them.

Tape-slide programmes

The main topics of the course in general pathology, which is taught at the start of the first clinical year, are covered in 19 tape-slide programmes, which were produced by the staff of the department in 1971¹ and revised in 1975 (See Appendix). A programme consists of a series (about 50) of colour transparencies and a tape recording

that lasts 20-25 minutes (uninterrupted playing). There are six copies of each programme: four ordinary versions and two longer versions that contain questions for self-testing. Each student receives a "hand-out" that summarises (in about 800 words) the contents of each tape, and also a longer version that includes the self-testing questions.

The student is expected to study the appropriate tape-slide programmes (1 or 2) before each tutorial-practical class (see below) to benefit properly from the latter. Many students use the shorter version of the programme for this purpose and the longer version for revision later in the term (that is, before the examination). The programmes are studied in a self-instruction area in the museum, which contains 24 places and is available every day, including Saturdays and Sundays, until 2100. Each place consists of a table on which there are a tape play-back unit, a projector, and a compact inexpensive back-projection screen of our own design that "folds" the beam of the projector. Separate units generally cost less than integrated self-instruction machines, and when a fault develops only one unit has to be repaired or replaced.

At first the slides were changed automatically by "pulses" on a second track on the tape, but most students preferred manual control because it made it easier to stop and reverse the tape and slides for revision. The ready availability of the tape-slide programmes makes it easy to study them more than once. A crowded curriculum, however, means that this often has to be done in the evenings and at weekends.

Tutorial-practical classes

Large practical classes using demonstrators have been replaced by tutorial-practical classes (two a week), each lasting one and a half

Department of Pathology, Medical School, University of Birmingham, Birmingham B15 2TJ

ROBERT C CURRAN, MD, FRCPATH, Leith professor of pathology
E LYNN JONES, MD, MRCPATH, senior lecturer