

Case Report

An Unusual Case of Fatal Suicidal Nitric Acid Ingestion

Rodrigues EJ*, Kantak MP**, Banaulikar SS*

ABSTRACT

An unusual case of suicidal nitric acid ingestion is being reported in a 24 year-old factory worker, with classical postmortem features of xanthoproteic reaction and necrotic perforation of stomach.

Key Words: Nitric acid, Xanthoproteic reaction, Gastric perforation

Introduction

Corrosive injury after accidental ingestion of caustic products is common in children.^{1,2} However, cases of suicidal ingestion of caustics such as nitric acid, among adults have been declining of late.³ We report here one such case with its characteristic postmortem findings.

The Case: A 24-year-old factory worker was brought to the Goa Medical College Hospital one morning with a history of suicidal ingestion of some acid the previous night. He had abdominal pain, and dyspnoea with crepitations on auscultation. Chemical burns were seen over the lips and tongue. Abdominal ultrasound showed free fluid in the peritoneal cavity, suggesting intestinal perforation. An emergency laparotomy was performed, which disclosed evidence of chemical peritonitis, and a perforated ulcer 2x1 cm in size, near the gastric pylorus, which was excised, followed by a gastro-jejunostomy. However, the patient died four days after admission to the hospital.

The dead body was transferred to the Goa Medical College Mortuary for postmortem examination. At autopsy, chemical burns with yellow discolouration were seen over the chin and lips of the person. There was yellow staining of the buccal, pharyngeal, and oesophageal mucosae. The stomach was soft and friable, with necrotic, yellowish brown mucosa. There was evidence of severe congestion. An intact gastro-jejunostomy surgical scar was seen. There was peritoneal congestion, oedema, and inflammation with pus.

The cause of death was furnished as peritonitis and shock as a result of nitric acid corrosive ingestion.

Discussion

Nitric acid is a clear, colourless, and fuming liquid with a peculiar, choking odour.⁴ It is used mainly in the preparation of explosives, and fertilizers such as ammonium nitrate.⁵ It is also used in electroplating and metal refineries.⁶ Engraver's acid contains 63% nitric acid. The fatal dose is said to be 10–15 mL.⁴

Nitric acid ingestion can cause retrosternal pain, abdominal pain, dysphagia, nausea, hypersalivation, vomiting, diarrhoea, haematemesis, metabolic acidosis, shock, collapse, hypotension, acute renal failure, disseminated intravascular coagulation, and also laryngeal oedema and airway obstruction.^{7,8} It causes superficial coagulative burns, and destruction of surface epithelium over the skin.

*Dept of Forensic Medicine & Toxicology, Goa Medical College & Hospital, Bambolim, Goa – 403202

***(Author for correspondence):* Dept of Forensic Medicine & Toxicology, Goa Medical College & Hospital, Bambolim, Goa – 403202. Email: mpkantak@yahoo.co.in

Blisters, ulceration and scarring can occur. Metabolic acidosis is often present. The diagnosis can be made by litmus test, or by dropping a small piece of copper into the stomach contents and heating it which results in pungent, dark brown heavy fumes, if nitric acid is present.⁶

In concentrated form, nitric acid combines with organic matter to produce a yellowish discolouration due to the production of picric acid. This is referred to as “xantho-protein reaction.”⁴ Thus in an individual who has been exposed to this acid, tissues are often yellowish in colour. Even teeth turn yellowish (in cases of ingestion). Mucosal membrane of the oesophagus and stomach may be yellow to brown to black due to the formation of acid haematin.⁹ Stomach often appears soft, friable, and ulcerated, and mucosal detachment and perforation may be seen. Microscopic sections of the stomach may show extensive areas of necrosis and oedema.

It has been claimed that ingestion of strong acids usually causes maximal damage to the distal oesophagus and stomach, while alkalis damage the oropharynx and upper oesophagus primarily.¹⁰ The acid pools in the stomach antrum and causes gastric outlet obstruction due to antral stenosis consequent to pyloric spasm, oedema and inflammation.¹¹ If the stomach is in the fasting state, large ingestion of concentrated acids will lead to early perforation. Thus the extent and severity of the injury is directly related to the concentration and amount of acid, as well as the length of time in the stomach and the amount of gastric content at the time of ingestion. In a prospective evaluation of 41 patients by Zargar et al,¹² burns in the oesophagus and stomach due to ingestion of acid were pathologically classified as follows:

- Grade 0 = Normal (2 patients)
- Grade 1 = Erosion in superficial mucosa (3 patients)
- Grade 2 = Necrosis in mucosa (16 patients) and
- Grade 3 = Ulceration (20 patients).

Oesophageal injury was seen in 87.8% and gastric injury was seen in 85.4% patients.

Conclusion

Suicidal poisoning by ingestion of acids like nitric acid among factory workers is quite common due to their easy accessibility. The characteristic colour (yellowish), nature of corrosion, and region of maximal involvement (necrosis) can help the doctor to diagnose death due to nitric acid ingestion.

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