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Selected Topics: Toxicology

SUCCESSFUL TREATMENT OF POTENTIALLY FATAL HEAVY METAL POISONINGS

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□ **Abstract—Pure inorganic heavy metal ingestions for suicidal intent are a rare occurrence. Most case reports on this subject focus on the serious neurological, hepatic, or renal side effects. We describe two cases of significant heavy metal poisonings (arsenic trioxide and mercuric chloride) that were successfully managed with aggressive decontamination and combined chelation therapy. Both chemicals were obtained in pure powder form through the Internet. © 2007 Elsevier Inc.**

□ **Keywords—heavy metal; arsenic; mercury**

INTRODUCTION

Pure inorganic heavy metal ingestions for suicidal intent are a rare occurrence. Most case reports on this subject focus on the serious neurological, hepatic, or renal side effects. We describe two cases of significant heavy metal ingestions, one involving arsenic trioxide and one involving mercuric chloride, that were successfully managed by combined chelation therapy. Both chemicals were obtained in pure powder form through the Internet.

CASE REPORTS

Case 1

A 30-year-old man with history of four prior medicinal suicide attempts presented to the Emergency Department with a chief complaint of premeditated arsenic trioxide ingestion 14 h before presentation. He bought 1000 mg of the white powder from an Internet auction site for $20. It came in an unmarked clear plastic Ziploc bag. He subsequently mixed the powder with water and ingested the solution.

Three hours after ingestion, the patient developed headache, nausea, and dizziness, followed by more than 10 episodes of repetitive vomiting. He denied hematemesis, diarrhea, abdominal pain, chest pain, or shortness of breath. He notified his mother the morning of presentation of his symptoms and she drove him to the Emergency Department for evaluation. He denied tobacco, alcohol, or other illicit drug use.

The patient had a history of depression and had four prior suicide attempts. He had undergone inpatient psychiatric treatment, including electroconvulsive therapy. He expressed confusion as to why he was still alive after taking such a large dose.

His medications included olanzapine 10 mg per day and venlafaxine HCL 375 mg per day for 5 weeks.

His review of systems was otherwise negative for sleep disturbance, anxiety, syncope, seizures, numbness or tingling of the hands and feet, involuntary movements, tremor, weakness, balance or gait disturbance.

The physical examination on initial presentation included the following vital signs: temperature of 37.1°C (98.8°F) (oral), pulse 112 beats/min, respiratory rate 20 breaths/min, blood pressure 133/98 mm Hg, pulse oximetry 100% on room air, and weight 200 lbs (90.9 kg). His

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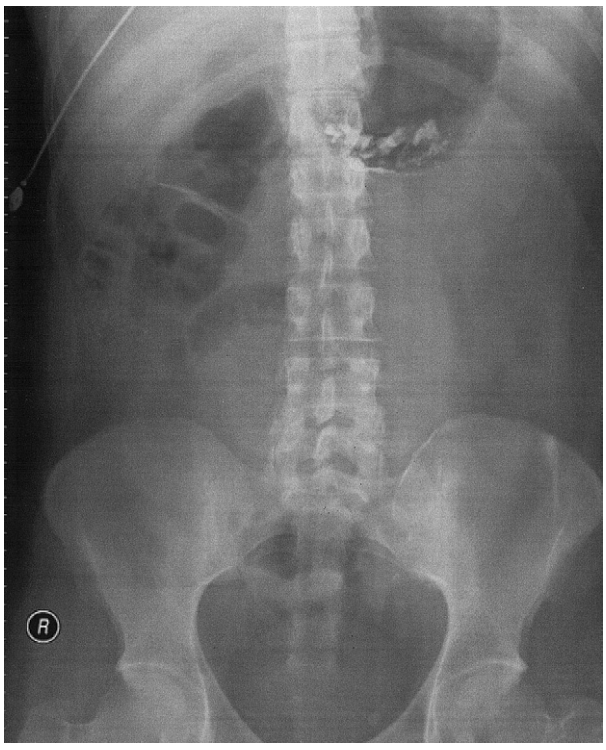

Figure 1. KUB demonstrating radiopaque arsenic within the distal stomach.

general appearance was healthy and he appeared in no acute distress. HEENT (head, eye, ear, nose, and throat) and lung examinations were normal. Cardiac examination was significant for tachycardia with a regular rhythm and no murmur. Abdomen was soft, non-tender, non-distended, and demonstrated normoactive bowel sounds. Neurologic examination demonstrated no signs of central nervous system (CNS) depression. Psychiatric examination demonstrated a flat affect and depressed mood, but no delirium or psychosis.

Electrocardiogram demonstrated sinus tachycardia with a corrected QT interval of 441 ms. Chest X-ray study was unremarkable. Complete blood count, electrolytes, BUN (blood urea nitrogen), creatinine, and aminotransferases were normal. Urine toxicology screen was positive for benzodiazepines. Serum alcohol, acetaminophen, and salicylate levels were negative. His KUB (kidney, ureter, and bladder X-ray) study demonstrated a high-density material within the distal stomach without evidence of obstruction or dilatated bowel loops (Figure 1).

Whole bowel irrigation with polyethylene glycol electrolyte solution was initiated in the Emergency Department. This was continued at a rate of 1.5–2 L/h for approximately 12 h after admission. Antidotal treatment for arsenic poisoning was initiated with British Anti-Lewisite (BAL) 5 mg/kg deep intramuscular injections every 6 h for 48 h. After the first dose of BAL (5 mg/kg) the patient began to complain of burning sensation in the lips, throat, and mouth, lacrimation, rhinorrhea, sweating, and nausea. We subsequently decreased the dose to 3 mg/kg every 6 h for 24 h and then 3 mg/kg every 12 h to complete a 10-day course. The patient experienced no further adverse effects of the BAL after the dose adjustment.

He was admitted to the Intensive Care Unit for close monitoring. Twenty-four-hour urine collection was initiated to monitor urine arsenic levels. Blood and stool arsenic levels were also sent. He developed transient transaminase elevation, which normalized over the course of the hospitalization. His neurologic status remained normal.

Serial KUB studies performed over the next 5 days demonstrated stubborn transit beyond the proximal colon (Figure 2). On hospital day 5, the patient underwent colonoscopy with colonic irrigation to remove the radiopaque densities that remained within the cecum and portion of the transverse colon (Figure 3). Post-colonoscopy KUB study demonstrated removal of the agent (Figure 4).

Daily 24-h urine and blood samples were taken and sent to the toxicology laboratory at Mayo Medical Laboratories (Rochester, MN) to be measured for arsenic

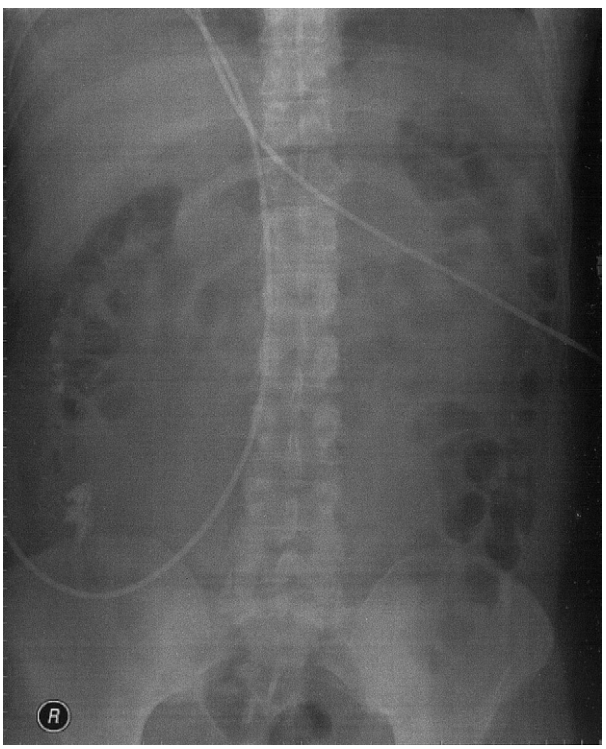

Figure 2. KUB demonstrating arsenic concretions in the proximal colon.