Acute Iodine Toxicity From a Suspected Oral Methamphetamine Ingestion
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ABSTRACT
BACKGROUND: Iodine is a naturally occurring element commercially available alone or in a multitude of products. Iodine crystals and iodine tincture are used in the production of methamphetamine. Although rarely fatal, iodine toxicity from oral ingestion can produce distressing gastrointestinal symptoms and systemic symptoms, such as hypotension and tachycardia, from subsequent hypovolemia.

OBJECTIVE: The objective of this case report is to describe a case of iodine toxicity from suspected oral methamphetamine ingestion.

CASE REPORT: A male in his early 20’s presented with gastrointestinal symptoms, chills, fever, tachycardia, and tachypnea after orally ingesting a substance suspected to be methamphetamine. The patient had elevated levels of serum creatinine, liver function tests, and bands on arrival, which returned to within normal limits by day 4 of admission. Based on the patient’s narrow anion gap, halogen levels were ordered on day 3 and indicated iodine toxicity. This is thought to be the first documented case of iodine toxicity secondary to suspected oral methamphetamine abuse.

CONCLUSION: Considering that the incidence of methamphetamine abuse is expected to continue to rise, clinicians should be aware of potential iodine toxicity in a patient with a history of methamphetamine abuse.

KEYWORDS: methamphetamine, iodine, toxicity

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Introduction
Iodine is a naturally occurring element discovered in the nineteenth century. It is available commercially as a tincture or as crystals and widely found in a variety of products including antiseptics, germicides, water treatment chemicals, contrast media, and pharmacologic compounds. Dietary sources are so common that the Recommended Daily Allowance (150 µg/day) is optimized or exceeded in most western countries, where intake may be as high as 930 µg/day. Human beings appear to have a high tolerance, particularly when ingestion is <2 mg/day acutely, because iodine must be converted to iodide, a generally nontoxic substance, or bound to proteins, starches, or unsaturated fatty acids before absorption from the intestine into the blood. Iodine is also used in the production of methamphetamine. Iodine crystals are used to produce hydriodic acid, which reduces pseudoephedrine to D-methamphetamine. Producers unable to obtain iodine crystals may produce them by mixing hydrogen peroxide with iodine tincture, which is more readily available for purchase. The tincture also circumvents the Comprehensive Methamphetamine Control Act of 1996, which requires a detailed record of all iodine crystal sales >400 mg.

Case Report
A male in his early 20’s with a history of methamphetamine abuse arrived at our institution after orally ingesting a “spoonful” of a tan, gooey pasty substance without smell or taste found inside a bag on the side of a road that he suspected to be...
methamphetamine. Shortly after ingestion, he reported the onset of chills, fever, abdominal pain, nausea, vomiting, diarrhea, and tachycardia. He reported drowsiness but no loss of consciousness. The substance was disposed of by the patient prior to arrival.

Upon arrival, he was tachycardic (110 beats/minute) and tachypnic (24 breaths/minute). His oxygen saturation was 89% on room air, which increased to 99% with oxygen via a non-rebreather mask. His temperature and blood pressure were normal (37.6 °C and 112/56 mmHg, respectively). The patient was oriented and responsive, but drowsy and in mild respiratory distress with diminished breath sounds in bilateral lower lobes. He had an elevated serum creatinine and liver function tests, a narrow anion gap (AG), bandemia, and an increased international normalized ratio (Table 1). His thyroid panel was normal. A urine drug screen was negative. His initial electrocardiogram (EKG) showed sinus rhythm with tachycardia, but the rest of his cardiac examination was normal. Chest radiograph indicated a pulmonary infiltrate in the right lower lobe and a chest computed tomography showed small bilateral pleural effusions with consolidation in the bases of both lungs.

The patient was admitted and placed on levofloxacin for pneumonia. On day 2, his symptoms had resolved, but his white blood count (WBC) increased to 20 with a fall in bands to 37%. By day 4, the WBC had returned to normal limits, repeat EKG was normal, and chest radiograph showed the infiltrate and effusions had resolved. Bromide, lithium, and iodine levels were drawn on day 3 due to the narrow AG. The

| LABORATORY PARAMETER | INITIAL | DAY 1 | DAY 2 | DAY 4 | NORMAL VALUES
|-----------------------|---------|-------|-------|-------|-----------------|
| pH                   | NM³     | 7.328 | NM    | NM    | 7.35–7.45       |
| PCO₂                 | NM      | 37.8 mmHg | NM | NM | 35–45 mmHg     |
| PO₂                  | NM      | 70 mmHg | NM | NM | 80–100 mmHg     |
| Bicarbonate (ABG)    | NM      | 20 mmol/L | NM | NM | 22–26 mmol/L   |
| Base excess           | NM      | −6.0 mmol/L | NM | NM | −2–2 mmol/L    |
| O₂ Saturation        | NM      | 93%⁴   | 97%   | 95%   | 94–100%        |
| WBC                  | 3.4     | 8.6    | 20.4  | 7.1   | 4.8–10.8 x 10³ |
| Hgb                  | 12.9 g/dL | 12.1 g/dL | 12.1 g/dL | 12.5 g/dL | 14.0–18.0 g/dL |
| Hct                  | 37.4%   | 35.4%  | 35.1% | 36.1% | 42–52%         |
| Platelet             | 166     | 142    | 137   | 160   | 150–430 x 10³  |
| Bands                | NM      | 47%    | 37%   | 9%    | 0–9%           |
| Na                   | NR⁵     | 139 mmol/L | 138 mmol/L | 138 mmol/L | 136–145 mmol/L |
| K                    | 3.3 mmol/L | 4.3 mmol/L | 3.9 mmol/L | 3.8 mmol/L | 3.6–5.0 mmol/L |
| Cl                   | NR      | 107 mmol/L | 106 mmol/L | 106 mmol/L | 98–107 mmol/L  |
| HCO₃⁻                 | NR      | 25 mmol/L | 25 mmol/L | 29 mmol/L | 22–28 mmol/L   |
| Scr                  | 1.6     | 1.4 mg/dL | 1 mg/dL | 0.7 mg/dL | 0.6–1.3 mg/dL  |
| BUN                  | NR      | 9 mg/dL  | 9 mg/dL | 7 mg/dL | 7–18 mg/dL     |
| Glucose              | NR      | 123 mg/dL | 96 mg/dL | 85 mg/dL | 65–110 mg/dL   |
| AST                  | 8 IU/L  | 330 IU/L | 126 IU/L | 29 IU/L | 10–42 IU/L     |
| ALT                  | 270 IU/L | 303 IU/L | 212 IU/L | 84 IU/L | 10–40 IU/L     |
| Albumin              | 6.3 g/dL | 2.9 g/dL  | 3.0 g/dL | 3.2 g/dL | 3.5–5 g/dL    |
| Total bilirubin      | 3.5 mg/dL | 0.9 mg/dL | NM | NM | 0.2–1 mg/dL    |
| ALP                  | 79 IU/L | 39 IU/L  | 45 IU/L | 46 IU/L | 32–92 IU/L     |
| CK                   | NM      | 36 IU/L  | NM | NM | 38–174 IU/L    |
| Tropl                | NM      | <0.15 ng/mL | NM | NM | <0.15 ng/mL   |
| Lipase               | NM      | 20 IU/L  | NM | NM | 8–57 IU/L      |
| TSH                  | NM      | 1.275 ulU/mL | NM | NM | 0.35–5.5 ulU/mL |
| INR                  | 1.4     | 1.6     | NM | 1  |                |

Notes: *Initial laboratory values from outside hospital within the same healthcare system. Normal values remain the same. ¹Normal values are accepted normal range for our institution at time of patient presentation. ²Laboratory parameter not measured. ³Oxygen saturation per arterial blood gas measurement. Patient initially presented with an oxygen saturation of 89% on room air per pulse oximetry which increased up to 99% after being placed on oxygen delivered via non-rebreather mask. ⁴Laboratory parameter not reported.

Abbreviations: pCO₂, partial pressure of carbon dioxide; pO₂, partial pressure of oxygen; ABG, arterial blood gas; O₂, oxygen; WBC, white blood count; Hgb, hemoglobin; Hct, hematocrit; Na, sodium; K, potassium; Cl, chloride; HCO₃⁻, bicarbonate; Scr, serum creatinine; BUN, blood urea nitrogen; AST, aspart aminotransferase; ALT, alanine aminotransferase; ALP, alkaline phosphatase; CK, creatine kinase; TSH, thyroid stimulating hormone; INR, international normalized ratio; NM, not measured; NR, not reported.
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