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CASE REPORT

Sudden Death Following Oral Intake of Metal Objects (Acuphagia): a Case Report

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Abstract: According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), pica is described as eating one or more non-nutritive, non-food substances over a period of at least 1 month that is severe enough to warrant clinical attention. The present case is a 44-year-old man who was brought to emergency department following severe abdominal pain, but died before admission or receiving any treatments. On the autopsy, 64 bolts and metal fittings (3700 grams) were found in the esophagus, stomach, small intestine, and large intestine of the patient.

Keywords: Death, sudden; intestinal perforation; peritonitis; pica; case report

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1. Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5), pica is described as eating non-nutritive, non-food items for at least 1 month (criteria A), which is sufficiently severe to necessitate clinical attention. This eating behavior is inappropriate for the developmental level of the individual (criteria B) and is not part of a culturally supported practice (criteria C).

Pica in adults and children above 2 years is considered to be developmentally inappropriate. It is often reported in people with mental disabilities, psychological disorders, and drug abusers (1). The used substances vary depending on their availability and the patient's age. They often include items such as paper, soap, fabric, hair, wool, plaster, talcum powder, paint, rubber, metal, charcoal, ash, and ice (2). Presence of a foreign body in the gastrointestinal tract, especially in high volumes, can cause bleeding, obstruction and rupture of intestines, and subsequently lead to peritonitis, shock, and death (3, 4). So far, several types of pica have been identified around the world, some of which are fatal. Herein, we present a 44-year-old man with fatal pica, who had swallowed 64 pieces of bolts and metal fittings.

2. Case Presentation:

The patient was a 44-year-old man with a high-school diploma, who was a construction worker. Apart from a history of stimulant and hallucinogenic drug use (amphetamine and hash), he had no history of physical or mental disorders in the past 5 years. His relatives were aware of his craving for metal objects, but they claimed that it had not caused any particular problems. He had no history of psychological problems or psychotic behaviors and beliefs.

Following severe abdominal pain and nausea, the patient was referred to a general practitioner in a local clinic, with no complaints other than abdominal pain and nausea. In the examination, the patient's vital signs were stable, and his abdomen was soft with scarce guarding in the epigastric region. He received outpatient treatment (intramuscular injection of hyoscine and ranitidine) and was referred to the hospital for further evaluation. After 30 minutes, he was discharged from the hospital with personal consent.

Three hours after discharge, the patient's sister called the emergency medical service (EMS) due to his increasing pain and deterioration of his general condition (pallor, hiccup, severe nausea without vomiting, and inability to walk). The paramedic's bedside examination revealed the follow-

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Figure 1: Perforation of duodenum and peritonitis caused by metal objects following acuphagia.

ing results: blood pressure: 85/P mmHg; respiratory rate: 25/minute; pulse rate: 140/minute; O_2 Saturation: 85% on room air; temperature: 37 Celsius; blood sugar: 105 mg/dL, and level of consciousness: 13/15 based on Glasgow coma scale.

After inserting an intravenous line and using normal saline serum, the patient was transferred to the hospital while oxygen was delivered through a nasal cannula. Before admission to the hospital, ventricular fibrillation and cardiac arrest occurred, which were followed by cardiopulmonary resuscitation by the paramedic. After hospital admission, resuscitation interventions continued in the emergency department; however, they were unsuccessful and the patient died. Considering the unknown cause of his death, his body was transferred to Tehran Forensic Medicine Center.

According to the autopsy, the cadaver was 170 cm in height and 60 kg in weight. He had a poor physical and hygienic condition upon admission and was covered in the hospital bed sheets. In the examination of rigor mortis, livor mortis was observed with a typical color on the back of the cadaver. Death had occurred within the past 24 hours. Apart from the injected areas in the cadaver's right elbow, there was no sign of being beaten. Similarly, there was no sign of fracture, dislocation, self-injury, tattooing, choking, defense wound, or electrical mark.

No specific problem was observed in the rectal and genital examinations. The skull was opened and examined, which showed no signs of fracture; also, the brain and meninges appeared normal. In the examination of cervical elements, no abnormalities were detected in the pharynx, larynx, or airways other than the presence of a metal nut in the middle third. In the chest, there was no sign of pneumothorax, hemothorax, or pleural effusion.

The lungs were anthracotic at the cutting site, but lacked any pus. The heart was 250 grams and showed no abnormalities on further examinations. Nevertheless, in the abdominal examination, the peritoneum space contained about 1.5 liter of dull green liquid of half-digested food, as well as fibrin and pus. A circular hole (about 1 cm in diameter) was also observed at the anterior surface of duodenum at a 3-cm distance from the pylorus with irregular edges and ecchymosis with rigid consistency, which seemed to have occurred within the past 24 hours.

The gastrointestinal tract was cut from the esophagus to the anus. Approximately, 64 pieces of metal (bolts, coins, and metal fittings), measured at 3685 gram, were detected and removed from the stomach, small intestine, and colon. Images were also acquired (Figure 1). The stomach wall included deep erosions with a patchy pattern (Figure 1).

There were fibrin fibers on the surface of the liver. Other parts of the gastrointestinal tract, retroperitoneal space, kidneys, and urinary tract were normal. The cause of death was confirmed as peritonitis caused by duodenal perforation. However, blood, urine, liver, gallbladder, and vitreous body samples were sent for toxicological examinations. In addition, samples from the brain, lung, heart, kidney, liver, and part of perforated duodenal area were sent for pathological tests. The toxicological test results of urine and gallbladder sam-

ples were positive for amphetamine and methamphetamine. Also, hypertrophy of myocytes in cardiac samples, moderate to severe edema in alveolar space in lungs, and moderate hypoxic/anoxic signs in cerebellum and brain cortexes were reported on the microscopic pathology.

3. Discussion

Acuphagia is described as eating sharp metal objects and is recognized as a type of pica (5). Pica refers to eating non-nutritive, non-food items in people without any underlying mental disorders. This condition can be sometimes a feature of some psychiatric disorders (e.g., developmental disorders, autism spectrum disorder, and even schizophrenia), as well as psychosis induced by hallucinogenic drugs (6). In our case, the patient had a history of amphetamine abuse, and acuphagia might have occurred due to hallucinations caused by amphetamine.

There are limited studies similar to the present case report. One of the first studies was conducted by Hambridge Silverman in 1973 (7). A 2.5-year-old girl who had a craving for metal objects was diagnosed with pica. The habit of eating metal objects (such as keys, buttons, and aluminum foils) had started 1.5 years before. The patient was treated for lack of appetite, which disappeared after pica treatment.

Pica appears to result from some metabolic disorders, such as iron, zinc, calcium, and magnesium deficiencies. It may occur at any stage of one's life, including childhood, adolescence, and adulthood; however, it is more common in childhood. The present case (a 44-year-old man) had no medical history of metabolic defects in childhood or adulthood.

In 2007, Hallidy and Iroegbu presented a 22-year-old Nigerian man with complaints of postnocturnal nausea, cough, muscle weakness, and swelling (5). The primary diagnosis was kwashiorkor (inadequate intake of protein and calorie). However, following radiography, metal objects were detected in the patient's abdomen. The patient was diagnosed with acuphagia (swallowing metal objects), although this condition is rare among adults.

Researchers have highlighted the importance of spiritual beliefs (juju or magical arts) and factors such as poverty, loneliness, and neglect in the emergence of eating disorders. Such behaviors are commonly reported in countries with traditional tribal cultures. Although these beliefs are seen in many countries, our case had no tribal or religious affiliations.

In 2008, Kariholou and Jakareddy presented a case of acuphagia and/or hyalophagia (8). A 20-year-old woman consumed 18 glass bangles, which were broken into 53 pieces (2-7 cm) in her stomach and intestines. The pieces were successfully removed through surgery.

In treatment of drug-addict patients with pica, the effects of drugs on their interests, behaviors, and symptoms should be considered. Drug use can not only trigger and intensify pica, but also lead to fatal conditions, similar to our patient's. Our case had no history of psychiatric diseases, mental disorders, or physical problems. According to his relatives, he tended to eat metal objects, but this craving did not disrupt his social relationships and activities.

On the other hand, drug use and its effects resulted in the masking of duodenal ulcer symptoms, which led to the negligence of the patient's severe condition when referred to the clinic. If he had been referred to the hospital immediately, he would have probably survived. Therefore, in management of patients with abdominal pain, physicians should consider their nutritional behaviors and drug use history.

It could be concluded that, acuphagia can be very serious in some cases and may cause emergency conditions, such as intestinal obstruction, perforation, peritonitis, bleeding, acute weight loss, poisoning, and even death.

4. Appendix

4.1. Acknowledgements

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4.2. Authors' contribution

All authors met the four criteria for authorship contribution based on the recommendations of the international committee of medical journal editors.

4.3. Conflict of interest

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