Glue sniffing intoxication

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Abstract

Glue sniffing, more commonly called volatile substance abuse (VSA) refers to the deliberate inhalation of volatile solvents, commonly found in adhesives, for the purpose of intoxication. The globally increasing prevalence of glue sniffing suggests that physicians will encounter many such patients some time during their practice. This review with two unusual cases aims to bring current issues related to VSA, such as compounds most commonly abused, the methods of abuse, and its direct effects along with management. Aim is to spread awareness among clinicians and practitioners treating children and adolescent identify and work effectively with young people who are abusing or at risk of abusing volatile substances.

Key words: volatile substance abuse, adhesives.

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Introduction

Glue sniffing, more commonly called volatile substance abuse (VSA) refers to the deliberate inhalation of volatile solvents, commonly found in adhesives, for the purpose of achieving a change in mental state. Common compounds are paints, chemicals, pharmaceuticals, rubber and also varnishes, lacquers, paint thinners, adhesives, glues, rubber cement, airplane glue, and shoe polish [1, 2]. Most of these compounds contain toluene, an aromatic hydrocarbon. It is emerging as a major cause of mortality and morbidity among teenage and younger population, especially of lower socioeconomic group in developed as well as developing countries as it gives a quick feeling of “kicks or high” with hallucinations, euphoria and dysinhibition similar to alcohol intoxication [3,4].

Deaths have been reported in people as young as 7 and as old as 75 years [5]. The likelihood of illicit drug use is more among children with the tendencies of attention deficit/hyperactivity disorder [1]. VSA has been shown to be drug of choice in 11-to 13- year old age group in England, second only to marijuana among 14-to 15- year olds. The street children in India were found abusing typewriter eraser fluid, which contains volatile substance toluene; the survey cited easy access, affordability, and a regular “high” as reasons for usage [6,7].

Case report

We report two uncommon cases of glue sniffing intoxication. Aim to report them is to spread awareness among clinicians treating children and adolescent. A 16 years old male child presented to the pediatric emergency department with complaints of generalized abdominal pain, vomiting of two hours duration and altered sensorium. He was found ingesting glue (Fevibond) and brought by police. It was not known whether the patient was in this habit for long. On admission, the Glassgow Coma Scale of patient was 3/15 with irregular shallow respiration, crepts audible on chest auscultation, hypertension and unequal pupils. His pulse and blood pressure were 82/min and 150/80 mm of Hg respectively. Deep tendon reflexes were brisk with mute plantar. The examination of other systems was unremarkable. Investigations revealed Hemoglobin of 13g/dl. White Blood count 14.6×103/mm^{3}with predominant polymorphs and normal platelet count. Blood urea was 32mg/dl, serum creatinine was 0.8mg/dl, potassium was 4.8meq/L, and sodium was 146meq/L. Arterial blood gas analysis showed metabolic acidosis. Urine analysis was normal. ECG was normal. Chest X-ray showed non homogenous opacity both lung fields. CT scan of head was planned but could not be done as the patient was critical.

The possibility of glue (Toluene) poisoning with raised intracranial tension with aspiration pneumonia was kept. He was put on ventilator along with supportive care and medical measures to control raised intracranial tension. Ionotropic support along with fluid boluses was required to maintain blood pressure. In spite of that, the condition of the patient deteriorated. Repeat renal function tests on 5th day showed blood urea of 126mg/dl and serum creatinine was 5.2mg/dl. Metabolic acidosis worsened. Sodium bicarbonate was given to correct metabolic acidosis and hemodialysis was planned after nephrology consultation. But he died on day 7 of hospital admission.

The second case was of 17-year-old male who presented with acute abdomen and renal failure. There was no history of diarrhea, hematemesis or malena. There was no past history of peptic ulcer disease, biliary disorder or sickle cell disease. He denied any history of non-steroidal anti-inflammatory drug ingestion and drug abuse. He was drowsy, afebrile and mildly dehydrated. His pulse and blood pressure were 100/min and 130/70 mm Hg respectively. There were no palpable intra-abdominal masses or hepatosplenomegaly. No free fluid was evident and normal bowel sounds were audible. Examination of other systems was unremarkable. He was treated conservatively and had complete recovery of renal functions in a week. The etiology of renal failure remained elusive on admission. While recovering from his illness, the patient revealed history of glue sniffing. This case highlighted that glue sniffing should be considered as one of the causes of acute renal failure, particularly in adolescent and young adult patients. Investigations revealed Hemoglobin of 12.6 g/dL, White Blood Count, 16.6×10 9 /L with predominant polymorphs and platelet count of 214×10 9 /L. The serum creatinine was 2.9 mg/dl, blood urea nitrogen was 200mg/dl, potassium was 3.3 meq/L, sodium 137 meq/L. Arterial blood gas analysis showed metabolic acidosis. Urine analysis showed Albumin 1+ with no pus cells or red blood cells. Ultrasound abdomen was normal. Chest X-ray and ECG were normal.

Urgent laparotomy was performed but no intra-abdominal surgical pathology was detected. He was managed by nephrology team. After hydration was improved, he became normotensive and his urine output improved. He was treated as a case of nonoliguric acute renal failure of uncertain etiology. He was managed conservatively by appropriate care of fluid, electrolytes and nutrition with uneventful course and progressive recovery of renal functions. By day six, the blood urea nitrogen and serum creatinine levels were within normal limits with normal urine output. However, the etiology of acute reversible renal failure remained elusive. While recovering from illness in the hospital, the patient confessed that he had been sniffing glue for kicks. The patient is presently under the care of a psychiatrist for psychotherapy.

Discussion

Substances involved in VSA are readily available, inexpensive or free, and usually although not always legal to purchase. The ‘high’ is achieved within seconds and the effect usually dissipates within half an hour. Most products are useful everyday items and found in homes, offices, and schools. It is difficult to prevent access to them. These products are too common to be perceived as harmful and the consequences of their use are misunderstood. They are commonly abused by huffing (i.e., soaking a sock or rag, then sniffing) and bagging (i.e., spraying paint into a plastic bag and inhaling). With bagging, exhaled air is rebreathed and resulting hypoxia and hypercapnia may add to the disorienting effects of the solvent. Method of administration depends upon the physical form of product available [8].

Sudden death is the most serious risk from their inhalation. Direct modes of toxicity leading to death are anoxia, respiratory depression, vagal stimulation, and cardiac arrhythmias along with trauma, aspiration, and asphyxia from plastic bag use. Acute intoxication from inhalation primarily affects the CNS, causing CNS depression, headache, seizures, ataxia, optic as well as peripheral neuropathy, stupor, and coma [9]. Chronic glue intoxication causes CNS sequael in form of neuropsychosis, cerebral cortex atrophy, cerebellar degeneration and ataxia, neuropathies, decreased cognitive ability, blindness, ototoxicity, and deafness. By sensitizing myocardium to circulating catecholamine it can cause arrhythmias. Pulmonary effects include bronchospasm, asphyxia, and aspiration pneumonitis.

GI symptoms from inhalation and ingestion may result in abdominal pain, nausea, vomiting, and hematemesis. Renal toxicity includes renal tubular acidosis, hypokalemia, azotemia, pyuria, hematuria, and proteinuria. Hepatotoxicity manifests with ascites, jaundice, hepatomegaly, and liver failure. With the widespread abuse of volatile substances in young people today, renal and hepatic dysfunction may present many years later when any link toVSA are long forgotten. Cutaneous contact with skin may cause dermatitis, extensive chemical burns with coagulation necrosis [7]. Toluene affects skeletal muscle and cause rhabdomyolysis, myoglobinemia, and a severe muscle weakness similar to Guillain-Barré. Chronic exposure to toluene by inhalation was found to affect bone metabolism, contributing to bone resorption and inhibiting bone formation [9].

Management includes supportive care including supplemental oxygen, with ventilator support if required. Remove the patient from area of contamination because toxic fumes may overcome rescue workers. Deal them in quite and calm environment. The concern lies in over stimulation the patient can cause catecholamine surge that could potentially precipitate arrhythmias. Caution should be exercised when considering the use of epinephrine in cardiac arrest patient thought to be secondary to VSA. Avoid mouth-to-mouth breathing because 20% of toluene is expired unchanged and the rescuer may be overcome by direct inhalation of fumes. Examine the skin for burns and treat them. Cardio version of dysarrhythmias induced by toluene exposure may be necessary. Use fluid boluses, dopamine, or epinephrine, if necessary, to maintain blood pressure. Monitor urinary output and kidney functions to avoid acute renal failure from myoglobinemia secondary to rhabdomyolysis.

Key approach to patients with volatile substance abuse includes:

1. Provide effective education on VSA to all young people.
2. Provide effective targeted interventions for young people abusing or at risk of abusing volatile substances.
3. Reduce easy availability and accessibility of volatile substances.
4. Help parents, caregivers and practitioners identify and work effectively with young people who are abusing or at risk of abusing volatile substances.

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