Acute Iron Poisoning: A Case Report

Abstract

In adults, the common cause of iron poisoning is iron overload caused by large excess of iron supplement intake at suicidal attempts. When serum iron level exceeds the iron binding capacity of the body, free radicals occur, leading to lipid peroxidation and cellular membrane damage. In iron poisoning, most affected organs are liver, heart, kidney and lungs. Also hematologic system is affected negatively. Acute iron poisoning can cause serious complications resulting in death. The treatment scheme is determined by the type of iron preparation, time of intake, and the onset of symptoms. Initial treatment approaches mostly consist of supportive care and removal of iron with bowel irrigation [1-3]. Early treatment and close follow-up in intensive care unit are important for acute iron poisoning. In this case report, we examined the approach to a case of acute iron poisoning with moderate dose iron intake for suicide attempt.

Keywords: Acute iron poisoning; Suicide; Intensive care unit

Introduction

In adults, the common cause of iron poisoning is iron overload caused by large excess of iron supplement intake at suicidal attempts. Excessive oral iron-induced caustic effect affects the gastrointestinal (GI) tract. This causes massive iron absorption. When serum iron level exceeds the iron binding capacity of the body, free radicals occur, leads to lipid peroxidation and cellular membrane damage. In iron poisoning, most affected organs are liver, heart, kidney and lungs. Also hematologic system is affected negatively. Acute iron poisoning can cause serious complications resulting in death [1,2]. The severity of poisoning depends on the amount of iron intake. If intake of elemental iron is below 20 mg/kg, the risk of toxicity is low, decontamination and at least 6 hours observation is recommended. There is a moderate risk of toxicity between 20 and 40 mg/kg. Decontamination and chelation therapy should be considered. Doses above 60 mg/kg are at high risk and decontamination with chelation therapy should be started [3]. In this case report, we examined the approach to acute iron poisoning with moderate dose iron intake for suicide attempt.

Case Report

A 22 years old female – weighs 60 kg-consumed 20 tablets of ferrosanol duodenal at home with suicidal attempt. (100 mg Fe+++ or 567,7 mg iron (II)-glycine-sulfate in each tablet). She applied to emergency service after 15-20 minutes. Gastric lavage was performed and arterial blood gas (ABG) resulted as pH: 7,14 pO₂: 53,4 mmHg pCO₂: 46,9 mmHg HCO₃⁻: 19 mmol/L BE: -10 mmol/L SO₂: %88. She was admitted to the intensive care unit for metabolic acidosis. There was no property in the patient's history. General condition was good, glasgow coma scale (GCS) was 15 and she was conscious. Vital findings and physical examination were normal. The patient who had vomited twice had no complaints of abdominal pain. Initial ABG was pH: 7,37 pO₂: 57,3 mmHg pCO₂: 34,8 mmHg HCO₃⁻: 20 mmol/L BE: -5,1 mmol/L SO₂: %88. Liver function tests for hepatotoxicity, renal function tests for nephrotoxicity, complete blood count for leukocytosis, and coagulation parameters for coagulopathy were evaluated in the laboratory and all of them were normal. Electrocardiogram was normal at sinusoidal rhythm. The first serum iron level was 379 μg/dl (high), iron binding capacity was 9 μg/dl (low), and ferritin was 19,9 ng / ml (normal) after 5 hours of drug intake. Deferoxamine treatment was not given because serum iron level of the patient was not higher than 500 μg/dl. ABG was pH: 7,35 pO₂: 88 mmHg pCO₂: 32,6 mmHg HCO₃⁻: 17,7 mmol/L BE: -7,8 mmol/L SO₂: %96 after 24 hours. Serum iron level was 180 μg/dl (normal), iron binding capacity was 136 μg/dl (normal), ferritin was 39.7 ng/ml (normal) 24 hours later. ABG was pH: 7,45 pO₂: 102 mmHg pCO₂: 36,3 mmHg HCO₃⁻: 24 mmol/L BE: -1,5 mmol/L SO₂: %98 at 48 hours. Serum iron level was 69 μg/dl (normal), iron binding capacity was 265 μg/dl (normal), ferritin was 44,6 ng/ml (normal) 48 hours later. The patient was discharged in good general condition.

Discussion

Acute iron poisoning can cause serious complications resulting in death. The severity of intoxication depends on the amount of iron intake. Iron toxicity can be classified as corrosive or cellular. Ingested iron can have an extremely corrosive effect on GI mucosa, which can manifest as nausea, vomiting, abdominal pain, hematemesis, and diarrhea; patients may become hypovolemic because of significant fluid and blood loss. Cellular toxicity occurs with the absorption of excessive quantities of ingested iron. Severe overdose causes impaired oxidative phosphorylation and mitochondrial dysfunction, which can result in cellular death. The liver is one of the organs most affected by cellular iron toxicity, but other organs such as the heart, kidneys, lungs, and the hematologic systems may also be impaired [1,2].
With both corrosive and cellular toxicity, the end result is significant metabolic acidosis, due to several factors. Hypoperfusion due to significant volume loss, vasodilatation, and negative inotropic effect of iron will result in lactic acidosis. Inhibition of oxidative phosphorylation will promote anaerobic metabolism. Individuals demonstrate signs of GI toxicity after ingestion of below 20 mg/kg. Moderate intoxication occurs when ingestion of elemental iron between 20-40 mg/kg. Ingestions exceeding 60 mg/kg can cause severe toxicity and may be lethal [3]. Our patient also had metabolic acidosis and had a moderate toxic dose of iron uptake (33 mg/kg). She had presented with only vomiting.

Clinically, iron toxicity manifests in five stages. Stage 1/stage of GI toxicity (0-6 h since ingestion) causes vomiting, hematemesis, abdominal pain and lethargy; Stage 2/stage of apparent stabilization (12-24 h since ingestion) when symptoms subside; Stage 3/stage of mitochondrial toxicity (24-48 h since ingestion) where patients may develop, coagulopathy, acute tubular necrosis, metabolic acidosis and shock. Stage 4 of hepatotoxicity (after 48 hours since ingestion) patients who survive this phase go into Stage 5/stage of gastric scarring (2-4 weeks since ingestion) characterized by gastric scarring and pyloric stricture. Iron poisoning can lead to cardiovascular collapse, mental status changes, gastrointestinal bleeding, liver and kidney failure [4]. For this reason, it should be diagnosed early, closely followed and treated in intensive care unit.

Treatment modalities include decontamination gastric lavage or whole-bowel irrigation. There are several presentations that may necessitate immediate initiation of deferoxamine therapy. They are: presence of metabolic acidosis, repetitive vomiting, lethargy, hypotension, or signs of shock. If the serum iron concentration is greater than 500 mcg/dL, deferoxamine therapy should be initiated. In our case deferrioxamine treatment was not given because serum iron level of the patient was not higher than 500 μg/dL [1,3]. The patient whom vital findings were stable was discharged after 48 hours.

Conclusion
The physicians should have the knowledge of the signs, symptoms, treatment and prognosis of iron poisoning. Acute iron poisoning may lead to serious complications that may result in death. Therefore, early treatment and closely follow-up in intensive care unit can reduce mortality.

Conflict of Interest
None.

References