
Case report

Mechanical Ventilation, Intravenous Liquid and Bicarbonate Infusion, Fomepizol and Hemodialysis Treatment in Serious Methanol Intoxication

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Abstract

Methyl alcohol is a type of alcohol commonly used in the industry. It can also be used illegally in manufactured drinks. Methanol poisoning is a clinical condition that can cause severe illness and death. A 47-year-old male patient who had complaints of abdominal pain and altered consciousness was brought to the emergency room by his relatives. They reported that he took methyl alcohol approximately 48 hours before admission in the emergency department. The patient was hospitalized as methyl alcohol poisoning. He was with severe acidosis for which NaHCO₃ at 1 mEq/kg was given and hemodialysis was performed. Fomepizole was given at a loading dose of 15 mg/kg, and a maintenance dose of 10 mg/kg every 12 hours up to three times was followed. After seven days of intensive care, the patient was discharged without any complications.

Key words: methanol poisoning, fomepizole, hemodialysis

Introduction

Methanol is used predominantly in industrial chemical solvents because of its organic solvent nature. It is a colorless, toxic substance in liquid form at room temperature. Methanol poisoning is often caused by ingestion of illegally produced beverages, as well as by accident or suicide [1]. The metabolites of methanol are very toxic. Methanol is first metabolized to formaldehyde and then formic acid by the alcohol-dehydrogenase enzyme. These metabolites are responsible for metabolic acidosis, blindness, cardiovascular instability and toxicity that can cause death [2]. Because methanol intoxication is not common, the reported number of cases is limited. In this article, we present a 47-year-old man with pH: 6.7 due to methanol intoxication.

Case

A 47-year-old male patient was admitted to our emergency room by his relatives because of a change in his consciousness. At first examination of the patient, the temperature was 36.6°C, blood pressure was 70/40 mmHg, pulse rate was 78 /min, respiratory rate was 22/min. The laboratory findings of the patient were as follows, pH: 6.7, PCO₂: 30 mmHg, PO₂: 60 mmHg, HCO₃: 7 mmol/L. Glaskow coma scale was calculated as 8 points, afterwards the patient was intubated and taken to the mechanical ventilator support. The rest of the biochemistry and complete blood count were as follows, glucose: 166 mg/dL, creatinine: 1.5 mg/dL, AST: 24 U/L, ALT: 11 U/L, Na: 136 mmol/L, K: 5.06 mmol/L, WBC: 46,000 x 10⁹/L, HGB: 15,6 gr/dl, PLT: 312 x 10⁹/L. The relatives of the patient reported that he took methyl alcohol approximately 48 hours before admission in the emergency department. The patient was assessed and methanol intoxication diagnose was confirmed due to unconsciousness, history of fake alcohol intake, pH and bicarbonate values in terms of deep metabolic acidosis. The blood methanol level of the patient could not be measured. Bicarbonate supplementation, hemodialysis and antidote therapy (3 vials of fomepizole) were applied to the patient as medical treatment. Extubation was performed 48 hours after the start of medical treatment and the patient was discharged 1 week later.

Discussion

Methanol poisoning often carries a high risk of death due to late admission in the hospital and sometimes delayed diagnosis. The general treatment approach of methanol poisoning includes gastric irrigation, ethanol and fomepizole administration, hemodialysis, folic acid and thiamin administration [1,3]. Stomach irrigation should be done in the first hour after intake, since our patient has arrived 48 hours later, no stomach irrigation was performed. Since active charcoal does not adequately bind methanol, it has no place in these poisonings. We

have not given any active charcoal since our patient did not have any other ingestions besides methanol. Ethanol is used in the classical initial treatment of methanol poisoning and can be given by oral, IV or nasogastric tube. 10% i.v. ethanol is used in 5% Dextrose. When used intravenously, loading dose is 10 ml/kg, maintenance dose is 1.6 ml/kg. Orally, 20-30% ethanol is used, with loading dose 0.6-0.8 g/kg, and maintenance dose 0.11 g/kg. If the patient is alcohol-dependent, the loading dose should be adjusted to 15 g/kg [1,2]. Fomepizole is a competitive inhibitor of alcohol dehydrogenase, inhibiting the conversion of methanol to formic acid, the major metabolite. Fomepizole administration is also recommended as follows, 15 mg/kg-loading dose, either intravenously or orally, independent of alcohol concentration, followed by intermittent 10 mg/kg-doses every 12 hours until alcohol concentrations <30 mg/dL [4]. If fomepizole administration is shortly after intake it can prevent ethylene glycol-related renal failure and methanol-related visual and neurological injuries [4]. Each maintenance dose of fomepizole can be given with slow i.v. infusion within 30 minutes. We have applied fomepizole administration to this case by first loading and then completing the treatment with maintenance dose. In a patient with methanol poisoning, dialysis should be performed if there is evidence of visual symptoms and signs of SSS dysfunction, peak methanol level above 25 mg/dL, severe metabolic acidosis, or more than 30 mL of methanol intake. The blood methanol level of the patient could not be determined because it is not performed in our hospital. Three sessions of hemodialysis were performed to correct the acidosis with increased anion gap confirmed in the arterial blood gas analysis. The pH level of the patient at first consultation is important in terms of prognosis. Severe acidosis and coma indicate poor prognosis. It is good prognostic sign that the patient's

consciousness is open? and hyperventilation is possible. Fomepizole is thought to be able to remove the need for hemodialysis if it is applied before the onset of major acidosis or organ injury [4]. When dialysis is indicated, continuous infusion of 1 mg/kg/h is recommended to compensate for elimination through the dialyzer's membrane [4]. Fomepizole is contraindicated in individuals who are allergic to pyrazoles and is not recommended during pregnancy.

Conclusions

Since antidotal therapy is available, it is important to recognize methanol poisoning immediately [5]. The presence of metabolic acidosis associated with an increased anion and osmolal gap is an important laboratory clue. Fomepizole is an effective and safe first-line antidote for methanol intoxications.

Conflict of interest statement. None declared.

References

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