Clinical Case Report

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Treatment of severe fluoroacetamide poisoning in patient with combined multiple organ dysfunction syndrome by evidence-based integrated Chinese and Western medicines

A case report

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Abstract

Rationale: Fluoroacetamide poisoning is the acute and severe disease of human, which leads to nervous, digestive, and cardiovascular system damage or even death in a short period of time.

Patient concerns: We report a case of a 65-year-old woman with loss of consciousness, nausea, and vomiting who was sent to the hospital by passers-by.

Diagnosis: She was diagnosed with severe fluoroacetamide poisoning with combined multiple organ dysfunction syndrome.

Interventions: When the diagnosis was unclear, we gave gastric lavage, support and symptomatic treatment, and closely with the vital sign. When the diagnosis was clear, based on the evidence of retrieved, muscle injection of acetamide, calcium gluconate, and vitamin C. Traditional Chinese medicine aspect, oral administration of mung bean soup of glycyrrhizae and Da-Cheng-Qi decoction enema.

Outcomes: By setting reasonable treatment for patients, she had no special discomfort and complications after treatment. Besides, through 1-month follow-up, it was confirmed that the treatments were effective.

Lessons: Evidence-based integrated Chinese and Western medicines can effectively improve the therapeutic effects in severe fluoroacetamide-poisoned patients with combined MODS.

Abbreviations: ALT = glutamic-pyruvic transaminase, AST = glutamic-oxaloacetic aminotrans, BNP = brain natriuretic peptide, CBM = Chinese biomedical literature database, CK = creatine kinase, CKMB = creatine phosphokinase isoenzyme, Cr = creatinine, EF = ejection fraction, eGFR = estimated glomerular filtration rate, hs-cTnI = high-sensitivity troponin, LDH = lactate dehydrogenase, MODS = combined multiple organ dysfunction syndrome, NH_3= blood ammonia, PCO_2 = partial pressure of carbon dioxide, PO_2 = oxygen partial pressure, RCT = randomized controlled trial.

Keywords: evidence-based., fluoroacetamide poisoning, integrated Chinese and Western medicines

1. Background

Fluoroacetamide is a kind of strong toxic, fast efficient alpha-naphthylthiourea (ANTU), and can cause death with only a 30-mg dose.[1] It is absorbed into the body mainly through the respiratory tract, the digestive tract, and skin. Then it gets converted into fluoroacetic acid through the body metabolism that leads to nervous, digestive, and cardiovascular system damage or even death. At the same time, it may cause secondary infections.[2] The fluoroacetamide is often used as a kind of pesticides in rural areas, which is easily available in the countryside but not in the cities. Besides, due to its airless and tasteless characteristics, it is more difficult to be diagnosed compared with the organophosphate poisoning, etc. So, when people come with some toxic reaction, it is easy to be misdiagnosed or missed being diagnosed in the city hospitals. The disease is particularly dangerous because it progresses rapidly and can cause death within hours.

2. Case presentation

A 65-year-old woman was presented with the loss of consciousness, nausea, and vomiting to the emergency department. Immediately after the ingestion, the patient felt drowsiness with nonspraying vomiting several times. After asking case history from her relatives, emergency medicine specialist considered the diagnosis as rat poisoning (Brodifacoum). Physical examination: slight coma, bilateral pupils equal, about 3 mm in diameter, and sensitive light reflex. After examinations, blood gas analysis: oxygen partial pressure (PO_2) 75.3 mm Hg and partial pressure of carbon dioxide (PCO_2) 32 mm Hg; coagulation: D-dimer was 24,140 μg/L FEUand blood ammonia (NH_3) 130 μmol/L. Myocardium zymogram examination: creatine kinase (CK) 126 U/L, creatine phosphokinase isoenzyme (CKMB) 20 U/L, and lactate dehydrogenase (LDH) 252 U/L. Brain natriuretic peptide (BNP) 1440.57 pg/mL. Blood routine, high-sensitivity troponin

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(hs-cTnI), renal function, and liver function were normal; the patient was treated with opening the vein channel, gastric lavage, improving brain metabolism, and preventing hemorrhage. After all these treatments, the doctors advised immediate hospitalization. During hospitalization, the patient's condition changes rapidly. She was in coma, blood pressure was 84/65 mm Hg, blood gas analysis showed PO_2 53.3 mm Hg, PCO_2 58.1 mm Hg, BNP 1440.57 pg/mL, hs-cTnI 9.29 μg/L, CK 4906 U/L, CKMB 85.6 U/L, LDH 777 U/L, creatinine 253.1 μmol/L, estimated glomerular filtration rate (eGFR) 16.61 mL/min/1.73 m^2, alanine aminotransferase (ALT) 215 U/L, aspartate aminotransferase (AST) 245 U/L, and NH_3 424 μmol/L. Cardiac color ultrasound: ejection fraction (EF) 46% and segmental ventricular wall motion abnormalities. Considering severe poisoning and MODS, dopamine injection was given to maintain blood pressure, trachea cannula and breathing machine were used to assist ventilation, vitamin K was given by iv drop to prevent bleeding, recurrent gastric lavage was given to reduce the absorption of rat poison, acid sodium bicarbonate was given via iv drop to correct acid–base imbalance, and so on. Clinical symptoms were relieved after expectant treatment. On the third day, the Occupational Health Monitoring Center of Guangdong Province detected fluoroacetamide in the blood following with diagnosis corrected for severe fluoroacetamide poisoning.

3. Clinical question

This example was case of severe fluoroacetamide poisoning in a patient with combined MODS. On the basis of routine treatment and symptomatic treatment, we put forward the following clinical questions: How to make a diagnosis and what treatment to give in modern medicine with fluoroacetamide poisoning? How to use Chinese Medicine to treat this disease?

4. Evidence retrieve

Computer retrieve: the Cochrane Library, the National Guideline Clearinghouse, PubMed, and Chinese biomedical literature database (CBM). Time is the time for building a database of retrieve to March 2015. According to the characteristics of each database, "fluoroacetamide" and "fluoroacetamide" were used for the search keywords. When it came to PubMed search, the language was limited to English and the literature object type was limited to human being. When CBM was used, the object type was limited to human being and the literature type was limited to clinical trials, randomized controlled trial (RCT), meta-analysis, and multicenter study.

5. Search results

First, there was no high-quality relevant evidence retrieved from the National Guideline Clearinghouse and the Cochrane Library system review. A total of 11 related literature works were retrieved from PubMed. Only 1 case report met the inclusion criteria.[3] Thirteen references were detected from CBM. Among them, there were 1 animal experiment which should be eliminated, 4 case series reports, and 8 RCTs. According to the principle of evaluation of the therapeutic literature quality, literature of higher quality should be selected to guide clinical diagnosis and treatment.

6. Evaluation of the evidence

Eight studies included claims to be RCT. Based on the principle of evidence-based medicine, to evaluate the authenticity of evidence of these studies, the main indicators included random, allocation concealment, blind, the integrity of the result, selective reporting, etc. As a result, the quality was not high, but according to the principle of currently acquired best evidence, they could still be adopted.

7. Diagnosis and treatment plan

Diagnosis of MODS: in the circulatory system assessment, patient's blood pressure was 84/65 mm Hg and it should be maintained in the satisfactory state by means of dopamine injection and fluid infusion. BNP was 1440.57 pg/mL, hs-cTnI was 9.29 μg/L, CK was 4906 U/L, CKMB was 85.6 U/L, and LDH was 777 U/L. In the respiratory system assessment, blood gas analysis showed PO_2 TC 53.3 mm Hg, PCO_2 TC 58.1 mm Hg, and it was required to use mechanical ventilation treatment. For the renal function, Cr was 253.1 μmol/L and eGFR was 16.61 mL/min/1.73 m^2. In the liver function assessment, ALT was 215 U/L and AST was 245 U/L. In the nervous system assessment, the patient was in a coma.

Based on the evidence of retrieved, we set the following treatment for the patient:

1. Clear fluoroacetamide poisoning, muscle injection of acetamide, calcium gluconate, and vitamin C.
2. Continue to strengthen the rehydration (mainly gastrointestinal tract), catharsis, protecting stomach, and correct the potassium sodium imbalances.
3. For the emergence of multiple organ function damage (breathing, heart, liver, and kidney), giving endotracheal intubation with auxiliary ventilation, intravenous pumping dopamine booster, ornithine aspartate by iv drop, lactulose oral liquid to drop the blood ammonia, compound glycyrrhizin tablet to protect liver, rocephin by iv drop with antiinfection, vasoel and levocarnitine for myocardial nutrition, niaoduqing granules to reduce the Cr and urea nitrogen, uric poisonous clear particles, and to stabilize renal function, and nexium to protect the stomach.
4. Traditional Chinese medicine, mung bean soup of glycyrrhizae was chosen, with detoxification and tonifying the middle and replenishing qi. Da-Cheng-Qi decoction was used to discharge poison of the gastrointestinal and recover consciousness, and to speed up the excretion of toxicity without obstruction.

8. Effect evaluation

After the treatment, blood gas analysis, troponin, heart, liver, and kidney function test results improved gradually. The patient was breathing smoothly with respirator removed. She could eat with no nausea, vomiting, and abdominal pain and her vital signs were all in stable conditions. After a month of follow-up, there were no special discomfort and complications and the patient was satisfied with the treatment process and effect, which claim that the evidence-based treatment is effective.

9. Discussion

Fluoroacetamide is a systemic insecticide for organic fluorine, being tasteless and odorless. Due to its good deratization effect, they are still used illegally in the rural areas. Thereby misdiagnosis or missed diagnosis of the disease can often happen in the city. Acetamide as the first treatment for the disease has a specific antidotes and enough drugs can delay poisoning, relieve

symptoms, or inhibit the action of the disease. But general hospitals have no storage of the drug. In this case, on the basis of the recurrent gastric lavage, catharsis, rehydration to prevent secondary infection, calcium with equivalent dose of glucose, and high doses of vitamin C could be added by iv drop. The associated rescue can also obtain a good effect.[4]

Combining with the history, the disease belonged to "the poisoning disease" of the category of the Chinese medicine. Traditional Chinese medicine could also have a certain clinical effect in the first aid of poisoning disease. For poisoning patients, in addition to detoxification, healthy qi needs to be protected. Therefore, mung bean soup of glycyrrhizae was chosen, with detoxification and tonifying the middle and replenishing qi.[5,6] Poison eating is the most direct and fastest way for gastrointestinal damage. At the beginning, the patient manifests sleepiness, and even coma, combined with the damage and gastrointestinal pesticide poisoning. Da-Cheng-Qi decoction was used to discharge poison from the gastrointestinal and recover consciousness, and to speed up the excretion of toxicity without obstruction so that it can improve the outcome of MODS.[7,8]

10. Conclusions

Severe fluoroacetamide poisoning combined MODS is a challenging clinical problem, especially when a doctor with no experience of the disease encounters it. Therefore, treatment decisions should be based on clinical evidence. At this point, the idea of evidence-based medicine, evidence retrieve and evaluation of evidence, and evidence for the application was made by the doctors, which turns the systematic pattern of individual clinical experience to an evidence-based clinical decision model.

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