

Acute diarrhea-induced shock during alcohol withdrawal: a case study

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Abstract

We present the case of a 54-year-old man with severe acute diarrhea during alcohol withdrawal, despite special feeding, correction of vitamin deficiencies, and protection of the gastrointestinal mucosa. Diarrhea is often overlooked, so we aim to draw attention to the risk of combined malnutrition, acute diarrhea, and alcohol withdrawal because this can lead to lethal complications. We recommend that patient's bowel movements should be carefully observed during alcohol withdrawal, even during hospitalization.

Keywords

Alcohol withdrawal, diarrhea, hyperkalemia, malnutrition, vitamin deficiency, hospitalization

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Introduction

A number of published reports have shown that diarrhea is a common symptom in alcohol dependence¹ that usually improves during hospitalization for alcohol withdrawal; therefore, it is easily ignored. Patients with alcohol dependence have long-term malnutrition and vitamin deficiency.² The case presented here illustrates how the combination of malnutrition, acute diarrhea, and alcohol withdrawal can lead to potentially fatal consequences, such as shock.

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Case report

The patient was 54 years old. He was an emaciated man with chronic diarrhea. From the age of 20 years, he had been drinking every day. He never succeeded in stopping his excessive alcohol consumption despite several attempts. He was admitted to the hospital owing to alcohol withdrawal. On admission, the first routine check revealed that the patient's blood pressure and pulse rate were 130/90 mmHg and 90 beats/minute, respectively. The initial laboratory data were as follows: potassium level 3.38 mmol/L, which was slightly below normal; all other indicators were within the normal range. Because the patient had chronic diarrhea, a special diet, oral vitamins, and gastric mucosal protective drugs and oral potassium chloride (KCL, 0.5 g twice a day) were given. However, he still had occasional diarrhea, which the patient paid no attention to, and he did not inform family members or medical staff at the time.

On a routine check one morning, the patient was weak and had rapid breathing, cold clammy skin, and anxiety corresponding to the initial symptoms of shock. After a detailed inquiry, we determined that the patient had experienced diarrhea dozens of times during the night, mostly watery stools, and had decreased urine output (100 mL/24 hours). Diosmectite (Smecta) rehydration was given (6 g, three times a

day) and relevant tests were performed. Blood pressure and pulse rate were 110/70 mmHg and 126 beats/minute. The results of blood tests revealed a very high level of potassium (6.32 mmol/L), leukocytes as high as $23.84 \times 10^9/L$, neutrophils $21.36 \times 10^9/L$, and creatinine 301.3 $\mu\text{mol/L}$, simultaneously, which exceeded the critical values (Table 1). Electrocardiogram (ECG) showed prolongation of the PR interval (Figure 1). Arterial blood gas analysis showed bicarbonate (HCO_3^-) 21.47 mmol/L, pH 7.21, partial pressure of carbon dioxide (PCO_2) 28.17 mmHg, and partial pressure of oxygen (PO_2) 66.48 mmHg, which were all decreased. In contrast, base excess (BE) 3.61 mmol/L and lactate 3.01 mmol/L were increased (Table 2). The results of arterial blood gas analysis are important in evaluating shock.³ This patient had been malnourished for a long time; he was emaciated and was now in critical condition, being at risk of cardiac arrest. The patient was treated with rehydration (0.9% NaCl) to correct electrolyte imbalance (glucose/insulin ratio 5 g/1 unit, oral KCL was stopped) and ameliorate renal function (uremic clearance granule 5 g, three times a day). We further supplemented vitamins via intramuscular injection (vitamin C 3 g/day, vitamin B6 300 mg/day). Considering that the patient had chronic diarrhea, his diet was carefully adjusted by a nutritionist. Seven hours

Table 1. Test results regarding physiological findings.

Parameters	Normal value	First test On admission	Second test Acute diarrhea	Third test After 7 hours' treatment	Fourth test After 3 days' treatment
Blood pressure (mmHg)	90–139/60–89	130/90	110/70	115/80	130/90
Pulse rate (beats/minute)	60–100	90	126	116	90
Potassium level (mmol/L)	3.5–5.3	3.38	6.32	5.86	3.8
Urine output (mL/24 h)	1000–2000	1600	100	1300	2140
Leukocytes ($10^9/L$)	3.97–9.15	4.51	23.84	19.62	5.01
Neutrophils ($10^9/L$)	2.04–7.6	5.32	21.36	17.33	6.22
Creatinine ($\mu\text{mol/L}$)	44–97	62.9	301.3	283.7	71.5

later, the patient's potassium level dropped to 5.86 mmol/L, his leukocytes were $19.62 \times 10^9/L$, neutrophils $17.33 \times 10^9/L$, and creatinine 283.7 $\mu\text{mol/L}$ (Table 1). His blood pressure returned to the normal range and his pulse rate was 116 beats/minute. Lactate dropped to 1.67 mmol/L and PO_2 was 76.74 mmHg. Levels of HCO_3^- , pH, PCO_2 , and BE were all within the normal range (Table 2).

After 3 days' treatment, the patient's test results showed that levels of potassium had decreased to 3.8 mmol/L and leukocytes,

creatinine and arterial blood gas analysis results (Tables 1, 2) were within the normal range. ECG showed that prolongation of the PR interval had returned to normal and his blood pressure and pulse rate were stable at approximately 130/90 mmHg and 90 beats/minute, respectively. The patient's skin had become warm, his emotions had stabilized, he was breathing regularly, and his urine output was increased (2140 mL/24 hours). Defecation was reduced to twice a day and the stool was soft.



Figure 1. Electrocardiogram. (a). First test on admission; (b) second test with acute diarrhea.

Discussion

Diarrhea is a common complaint among people with acute and chronic alcoholism, which may lead to dehydration and electrolyte deficiencies in those who are alcohol dependent. Unlike common diarrhea caused by infection among binge drinkers, the exact causes of diarrhea in people with alcohol dependence are still unknown, although the effects of ethanol on the gastrointestinal tract have been well studied. Alcohol can lead to structural damage to the microvasculature and epithelium, as well as increased mucosal permeability, which can contribute to diarrhea.^{1,4} Impaired absorption of nutrients and vitamins are also important factors in the pathogenesis of diarrhea among alcoholics. With abstinence and correction of malnourishment and vitamin deficiencies, diarrhea will slowly improve in most patients after admission to the hospital. Therefore, this symptom is often neglected during hospitalization. Alcohol withdrawal coexisting with acute diarrhea is rare. The disease progression of the patient in this case is considerably different to that of other patients as his condition deteriorated very quickly.

Our patient's potassium concentration was lower than normal in initial laboratory tests. A number of studies have shown that potassium levels fall during alcohol

withdrawal;⁵ therefore, oral potassium supplementation should be given routinely after hospitalization in such patients. In the present case, the patient's diarrhea had been ignored, even when acute, and it was therefore not treated in a timely manner. Diarrhea may lead to dehydration and decreased urine output, causing hyperkalemia, which can induce deadly cardiac arrhythmias.⁶ Hence, the management of alcohol withdrawal accompanied by diarrhea is different from conventional treatment; levels of potassium must be monitored in a timely fashion because development of either hyperkalemia or hypokalemia can be life-threatening. After acute diarrhea, our patient's potassium and creatinine levels increased rapidly and ECG showed prolongation of the PR interval; at the same time, he had symptoms of shock. Therefore, diarrhea is definitely a symptom that cannot be ignored during alcohol withdrawal.

There is a lack of systematic studies on the pathophysiology of alcohol abuse; thus, the mechanism underlying diarrhea during alcohol withdrawal is still not well understood. Because alcoholics are already at higher risk for diarrhea owing to malnutrition, vitamin deficiency, and impaired gastrointestinal function, careful monitoring of defecation is necessary, even during hospitalization. As described in this case

Table 2. Results of arterial blood gas analysis.

Parameters	Normal value	First test Acute diarrhea	Second test After treatment 7 hours	Third test After treatment 3 days
HCO ₃ ⁻ (mmol/L)	22–26	21.47	25.24	24.71
pH	7.35–7.45	7.21	7.40	7.42
BE (mmol/L)	-3 to +3	3.61	1.58	1.63
Lactate (mmol/L)	0.5–1.6	3.01	1.67	1.47
PCO ₂ (mmHg)	35–45	28.17	36.21	37.15
PO ₂ (mmHg)	80–100	66.48	76.74	86.31

HCO₃⁻, bicarbonate; PCO₂, partial pressure of carbon dioxide; PO₂, partial pressure of oxygen; BE, base excess.

report, such monitoring is needed even if the patient is receiving special feeding, vitamin replacement, and has improved gastrointestinal function. Moreover, even if withdrawal symptoms improve, diarrhea will continue if not addressed, and severe diarrhea may occur at any time in patients undergoing alcohol withdrawal. This is different to withdrawal from any other substance. Further research is needed to identify whether some or all such patients who are consuming a normal diet and without chronic diarrhea should be monitored. During alcohol withdrawal, observation of defecation and diet is needed, even after improvement of symptoms, to avoid recurrence.

Ethics statement

Our case report was conducted as a retrospective study and in accordance with the Guidelines for Clinical Trials of The Second Affiliated Hospital of Xinxiang Medical University. The patient provided verbal informed consent for the publication of his clinical data. All personal information remains confidential.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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