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Repetitive Vomiting and Acute Renal Failure as the Presenting Features of Cannabinoid Hyperemesis Syndrome

Chin-Chun Chang, Yu-Juei Hsu, Pauling Chu, and Shih-Hua Lin*

Division of Nephrology, Department of Internal Medicine; Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, Republic of China

Cannabinoid hyperemesis syndrome (CHS) characterized by cyclic vomiting after chronic cannabis exposure has been increasingly reported but still less-appreciated with acute renal failure. An otherwise healthy 50-year-old man manifested vigorous vomiting with severe acute renal failure and metabolic alkalosis in the emergency department repetitively. Without receiving hemodialysis, all of his clinical symptoms and abnormal laboratory findings completely resolved after aggressive volume repletion, electrolyte supplementation, and control of vomiting. There was no ascertainable etiology for vomiting after serial laboratory and radiological workups. Based on his positive urine toxicology screening for tetrahydrocannabinol, an ill-concealed history of cannabis smoking, and the behavior of compulsive and prolonged hot spring baths alleviating the intractable vomiting, he was believed to have CHS. Repetitive vomiting and acute renal failure may be the presenting feature of CHS. Early recognition of CHS with prompt treatment is crucial to avoid futile examinations and inappropriate management, and to hasten cannabis cessation.

Key words: acute renal failure, cannabinoid hyperemesis, metabolic alkalosis, vomiting

INTRODUCTION

Cannabinoid hyperemesis syndrome (CHS), a new clinical syndrome first described in 2004, is characterized by intractable cyclic vomiting and compulsive bathing behavior associated with long-term cannabis exposure.[1] Clinical symptoms and signs related to CHS were alleviated by hot baths/showers and gradually resolved following abstinence from cannabis. Given the increasing extent of illegal and recreational cannabinoid use worldwide, CHS may become more prevalent and frequently encountered by physicians. However, CHS is still easily overlooked with delayed diagnosis leading to inappropriate management even after extensive medical investigations.[2] We describe a chronic unrecognized cannabis user manifesting repetitive vomiting with severe acute renal failure and metabolic alkalosis to highlight the importance of its prompt recognition and management.

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*Corresponding author: Shih-Hua Lin, Division of Nephrology, Department of Medicine, Tri-Service General Hospital, National Defense Medical Center, No. 325, Sec. 2, Cheng-gong Road, Taipei 114, Taiwan, Republic of China. Tel: +886-2-87927213; Fax: +886-2-87927322; E-mail: l521116@ndmctsgh.edu.tw

CASE REPORT

A 50-year-old man presented to the emergency department (ED) with a 5-day history of intractable vomiting, epigastralgia, asthenia, and progressively disturbed consciousness. He had unintentional weight loss of 5kg in one week, but denied headache or change of bowel movements. He also denied other similar episodes in the preceding 3 years. There was no pertinent family or past medical history. He had normal pupil size and light reflex without meningeal signs or pathological reflexes. He was afebrile with blood pressure 120/78 mmHg, pulse 106 beats/min, and respiratory rate 14 breaths/min. Physical examination revealed depleted extracellular fluid (ECF) volume with dry oral mucosa, flat jugular vein, and diminished skin turgor. There was hypoactive bowel sound, mild tenderness over epigastrium, but no rebound tenderness or flank pain.

Pertinent laboratory findings included elevated serum creatinine (9.2 mg/dL) and blood urea nitrogen (152 mg/dL) concentration, marked metabolic alkalosis (pH 7.543, HCO_3^- 63.7 mEq/L), hypokalemia (2.9 mmol/L), hyponatremia (130 mmol/L), high serum uric acid (16.7 mg/dL) and phosphate (10.2 mg/dL), but low calcium (7.9 mg/dL) concentration (Table 1). Urinalysis revealed acidic urine (pH 5.5) with bland sediments. His serum levels of glucose, amylase, lipase, alkaline phosphatase, C-reactive protein, cortisol, liver and thyroid function were within

Table 1 Laboratory findings in three admissions

ED visits	1st	2nd	3rd
Hgb (12.5-17 g/dL)	15.7	15	14.8
pH (7.35-7.45)	7.543	7.513	-
P_{co2} (40-45 mmHg)	75.7	65	-
Bicarbonate (25-28 mEq/L)	63.7	51.1	-
P_{o2} (75-100 mmHg)	56.6	65.4	-
Na^+ (136-145 mmol/L)	131	126	129
K^+ (3.5-5.1 mmol/L)	3.1	2.6	3.0
Cl^- (98-107 mmol/L)	53	50	51
BUN (urea) (6-20 mg/dL)	152	187	183
Creatinine (0.7-1.2 mg/dL)	9.2	9.2	10.1
Uric Acid (4-7.0 mg/dL)	16.7	14.3	23.2
Calcium (8.6-10.2 mg/dL)	7.9	8.2	5.0
Phosphate (2.7-4.5 mg/dL)	10.2	9.1	9.7

normal limit. Abdominal ultrasound showed neither distended urinary bladder nor hydronephrosis. Abdominal and cerebral computed tomography scan were unremarkable.

Despite severe renal failure, he received aggressive intravenous saline infusion (2500 ml/day) with KCl supplementation (40 meq/day) and intermittent administration of antiemetics rather than emergent hemodialysis considering his remarkable ECF volume depletion and history of intractable vomiting. His daily urine output had maintained over 900 ml (body weight 70kg, height 174cm) since admission, and all his clinical symptoms and abnormal laboratory values resolved significantly 5 days later. Esophagogastroduodenoscopy demonstrated superficial esophagitis. After discharge, he revisited our ED with similar clinical scenario, laboratory findings, and treatment course twice in 6 months (Table 1). The urine toxicology screening was negative for opiates, amphetamine, cocaine, barbiturate, and benzodiazepines, but positive for tetrahydrocannabinol (THC) at his second ED visit. Upon a pointed inquiry on drug history, he admitted to keeping smoking cannabis for 3 years and started having nausea and vomiting following binge smoking one week before his first ED visit. He simultaneously developed a habit of frequent hot spring baths lasting for more than 4 hours each time to alleviate symptoms. He was believed to have CHS but unwilling to cooperate in further counseling for cannabis cessation and lost follow-up.

DISCUSSION

This 50-year-old man manifested intractable vomiting, epigastralgia, and disturbed consciousness accompanied by acute renal failure and marked metabolic alkalosis thrice in 6 months. Although renal failure *per se* can cause vomiting, rapid resolution of concurrent severe metabolic alkalosis and acute renal failure following the control of vomiting and volume repletion suggested that vigorous vomiting may result in acute renal failure. He was proved to have CHS based on positive THC on the urine toxicology screen and a characteristic behavior of compulsive, prolonged hot baths associated with chronic habitual use of inhaled cannabis.

Cannabis is the most common illicit drug consumed globally. Despite its antiemetic property, the paradoxical emesis from chronic cannabis use was recently unveiled, probably related to its chronic stimulation of the cannabinoid type 1 (CB1) receptors distributed in the central nervous system and myenteric plexus through gastrointestinal transit.[3] The fact that CHS usually developed in the heavy cannabis users may be related to larger dose of consumption and the long half-life of cannabinoids with consequential accumulation in the body.

The resultant profuse and repetitive vomiting may cause significant gastric juice loss with concomitant loss of H^+, Cl^-, K^+ and volume, ultimately leading to metabolic alkalosis and hypovolemia with pre-renal azotemia.[4] According to a recent case series, many patients with CHS required frequent hospitalizations for volume repletion and electrolyte imbalance.[2] At least two other similar cases of CHS featuring the prominent feature of reversible severe acute renal failure has been reported in the literature.[5,6] CHCH Further clinical studies are needed to elucidate the prevalence, risk factors, and outcome of acute renal failure in CHS. Additionally, an instant referral to resources for cannabis cessation counseling and cognitive-behavior therapy is of utmost importance to achieve sustained abstinence from cannabis.[1,2]

In acutely-ill patients presenting with concurrent renal failure and metabolic alkalosis, the differential diagnosis comprised following conditions: ingestion/administration of alkali-containing drugs/agents, loss of HCl from stomach, loss of NH_4Cl in the urine, and loss of NaCl in ECF volume. Patients with ingestion/administration of alkali-containing drugs/agents often have expanded ECF volume or hypercalcemia (milk-alkali syndrome characterized by hypercalcemia with secondary metabolic alkalosis and renal failure associated with excessive calcium and alkali intake).[7] The Cl^--losing conditions with H^+, NH_4^+, or Na^+ usually have true volume depletion, and can be differentiated by the assessment of urine Na^+, Cl^-, and pH.[8]

In conclusion, CHS must be kept in mind as the cause of acute renal failure and metabolic alkalosis associated with unexplained vomiting to avoid futile examinations and erroneous management.

DISCLOSURE

The authors declare that this study has no con?ict of interest.

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