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3 Recurrent Vomiting and 60-lb Weight Loss in a 17-year-old Girl

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AUTHOR DISCLOSURE Dr Wilson has disclosed no financial relationships relevant to this article. This commentary does not contain discussion of an unapproved/investigative use of a commercial product or device.

PRESENTATION

A 17-year-old girl presents to the emergency department with a 2.5-week history of bilious emesis and left upper quadrant (LUQ) pain. She had a similar episode approximately 4 months ago that lasted 3 weeks and another briefer episode 1 month ago. During these episodes, she was treated with intravenous (IV) fluids and antiemetics but was never hospitalized. She denies diarrhea, bloody stools, hematemesis, or fever. Her pain and nausea have no clear exacerbating factors but improve when she takes hot showers or baths. She reports unintentional weight loss of 60 lb over 4 months. The patient is sexually active with women only and uses ethanol and cannabis recreationally.

Physical examination reveals an uncomfortable and diaphoretic teenager of normal habitus. For her age, her height is at the 47th percentile, weight at the 80th percentile, and body mass index at the 81st percentile. Her vital signs are initially normal, but her blood pressure rises to 150/90 mm Hg and heart rate decreases to 50 beats per minute during a pain episode. Abdominal examination findings include mild periumbilical and LUQ tenderness. The remainder of the physical examination findings are unremarkable.

Results of initial laboratory evaluation include: normal complete blood cell count; serum bicarbonate of 23 mEq/L (23 mmol/L); normal serum levels of electrolytes, glucose, amylase, lipase, alkaline phosphatase, and alanine aminotransferase; and erythrocyte sedimentation rate of 16 mm/h. A urine pregnancy test result is negative. The urinalysis is positive for trace ketones. A fluoroscopic upper gastrointestinal series yields normal results. Computed tomography scan of the head without contrast appears normal. Additional evaluation and observation of the patient's clinical course reveals the diagnosis.

DISCUSSION

The adolescent was treated with IV fluids, ondansetron, and promethazine but obtained no relief of her nausea. Hypertension and bradycardia did not recur. During her admission, she was noted to spend hours at a time in the shower or the bathtub, which she said was effective in reducing her nausea. Further history revealed that she had been a daily cannabis user for approximately 3 years, currently smoking 5 to 8 g (5-8 "blunts" of 1 g each) daily. Clinicians diagnosed cannabinoid

hyperemesis syndrome (CHS). After 4 days, the patient's symptoms had resolved completely and she was discharged home, where she continues to do well.

Differential Diagnosis

The differential diagnosis of recurrent vomiting in children is vast. By categorizing causes according to organ system, clinicians may generate a reasonably complete list.

Gastrointestinal causes include gastritis, peptic ulcer disease, malrotation with recurrent volvulus, Crohn disease, cholelithiasis, and pancreatitis. Neurologic causes include migraine or abdominal migraine and less commonly, intracranial neoplasms or Chiari malformations. Metabolic causes often present with biochemical abnormalities such as hypoglycemia and include fatty acid oxidation disorders, mitochondrial disease, urea cycle disorders, and acute intermittent porphyria. Among the endocrine causes are Addison disease and diabetes mellitus with ketoacidosis. Urologic causes described in the literature include acute hydronephrosis and nephrolithiasis. Among the psychiatric causes are psychogenic vomiting and eating disorders, including anorexia nervosa–purging subtype, bulimia, and rumination syndrome. The cyclic vomiting syndrome is a poorly understood entity consisting of recurrent nausea and vomiting episodes with no apparent cause; it is a clinical diagnosis of exclusion. This patient's unique history of symptom relief with hot bathing, however, was the key to diagnosing CHS.

The Condition

CHS was first described in the literature in 2004. Since then, several case series have been published with a combined total of more than 50 patients. CHS likely is underdiagnosed and may be misdiagnosed as cyclic vomiting syndrome. A retrospective review of patients presenting to the Mayo Clinic over a 5-year period found 98 patients meeting criteria for CHS. Cannabis is the most prevalent drug of abuse in teenagers. From 2008 to 2013, cannabis use increased among all high school-age children, notably from 19.4% to 22.7% among 12th graders, even as the rate of other illicit drugs use decreased. Because cannabis is increasingly used for medicinal purposes or legalized for recreational use, this trend may continue.

Delta-9-tetrahydrocannabinol (THC), the principal cannabinoid in marijuana, acts on cannabinoid type 1 (CB1) receptors present in the enteric plexus and central nervous system. It is the action in the central nervous system that is believed to provide the agent's anti-nausea effects. It is unclear why chronic heavy cannabis use leads to a paradoxical increase in nausea with hyperemesis. Some propose that delayed intestinal motility is the primary issue; others cite

other active cannabinoids found in cannabis that have opposing actions on CB1 receptors.

CHS is characterized by periods of hyperemesis accompanied by incapacitating nausea and abdominal pain. Some have proposed that CHS consists of a prodromal phase, a hyperemetic phase, and a recovery phase. During the prodromal phase, patients experience early morning nausea, which they sometimes treat by increasing cannabis use. The hyperemetic phase can involve vomiting multiple times per hour and lasts hours to weeks. Recovery lasts days to weeks.

In some cases, CHS is complicated by the development of acute renal failure. The cause is believed to be prerenal, with volume depletion from persistent vomiting exacerbated by increased insensible losses and vasomotor changes due to hot bathing. All reported patients recovered with aggressive IV hydration.

Diagnosis

Clinical criteria form the basis of the CHS diagnosis. Santorini et al proposed diagnostic criteria for the syndrome (Table), and Wallace et al developed a flow chart for diagnosis. All reported cases have been in patients using cannabis daily for at least 1 year. Frequent hot bathing, to the point of becoming a compulsive behavior, is a unique feature of this syndrome.

TABLE. **Proposed Diagnostic Criteria for Cannabinoid Hyperemesis Syndrome**

ESSENTIAL FOR DIAGNOSIS OF CANNABINOID HYPEREMESIS SYNDROME
<ul style="list-style-type: none"> • History of regular cannabis use for years
Major Clinical Features:
<ul style="list-style-type: none"> • Severe nausea and vomiting • Vomiting that recurs in a cyclic pattern over months • Resolution of symptoms after stopping cannabis use
Supportive Features
<ul style="list-style-type: none"> • Compulsive hot baths with symptom relief • Colicky abdominal pain • No evidence of gallbladder or pancreatic inflammation

Adapted from Santorini S et al. Cannabinoid hyperemesis syndrome: clinical diagnosis of an underrecognized manifestation of chronic cannabis abuse. World J Gastroenterol. 2009;15(10):1264-1266. Reproduced with permission from World Journal of Gastroenterology, Copyright 2009 The WJG Press and Baishideng. Full text may be available from the World Journal of Gastroenterology's website: <http://www.wjgnet.com>.

Management

Patients presenting in a hyperemetic phase of CHS often are volume-depleted and require oral or IV rehydration. If volume depletion is severe or urine output remains low after administration of fluids, renal function should be tested. Because esophagogastrosomy in patients with CHS has shown gastritis and esophagitis, many clinicians routinely prescribe acid suppressive therapy. Antiemetics typically are unhelpful, although a case report has documented relief with haloperidol. Pain is usually treated with nonopioids because of concern that opioids might worsen nausea. Patients may be encouraged to continue hot bathing for pain and nausea relief. Curative therapy consists of cessation of cannabis use, after which pain and emesis typically resolve over 48 hours. Resumption of cannabis use leads to relapse. Educating the patient about the cause of symptoms is key because many perceive cannabis to be helpful for their nausea.

Although cannabinoids are believed to be less addictive than many drugs of abuse, approximately 9% of users become addicted, and daily users are at higher risk, with

25% to 50% addiction rates. Patients with CHS should be referred to inpatient or outpatient drug rehabilitation programs.

Lessons for the Clinician

- Recurrent vomiting has a broad differential diagnosis that includes gastrointestinal, neurologic, metabolic, urologic, psychiatric, and toxic causes.
- Cannabinoid hyperemesis syndrome (CHS) presents in chronic daily or almost-daily users of cannabinoids, typically after more than 1 year of use.
- Diagnosing CHS is often substantially delayed; one important diagnostic clue is the learned behavior of hot bathing to relieve pain and nausea.
- In cases of CHS, an extensive or prolonged diagnostic evaluation is not necessary.
- Curative therapy for CHS consists of cessation of cannabis use.

Suggested Readings for this article are at <http://pedsinreview.aapublications.org/content/37/6/264>.

Correction

In the January 2016 review “Developmental Milestones” (Scharf, Scharf, Soustrup. *Pediatrics in Review*. 2016;37(1):25–38, DOI: 10.1542/pir.2014-0103), a line was duplicated inadvertently. In Table 3: Developmental Milestones, at age 5 months, fine motor skills should not include “Holds hands together.” The online version of the article has been corrected. The journal regrets the error.

ANSWER KEY FOR JUNE 2016 PEDIATRICS IN REVIEW

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Preventing Infections in Children with Cancer: 1. C; 2. B; 3. E; 4. C; 5. E.

Case 3: Recurrent Vomiting and 60-lb Weight Loss in a 17-year-old Girl

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Pediatrics in Review 2016;37;264

DOI: 10.1542/pir.2014-0105

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DOI: 10.1542/pir.2014-0105

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