

Pediatric Cannabinoid Hyperemesis

Two Cases

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Abstract: Cannabinoid hyperemesis has recently been described in the literature. It is a syndrome characterized by severe nausea and hyperemesis in the setting of chronic marijuana abuse and, to date, has been described only in adults. We describe the syndrome in 2 pediatric patients, for whom extensive gastrointestinal workups failed to identify a clear cause and cessation of marijuana use resulted in the alleviation of their symptoms. As in most published adult cases, compulsive bathing was present in both of these cases.

Key Words: cannabinoid hyperemesis, cyclical vomiting, marijuana, cannabinoids

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Marijuana is the most commonly abused illicit drug in the United States.¹ Although cannabinoids are used to treat nausea and vomiting, a paradoxical syndrome termed cannabinoid hyperemesis, first described in 2001 in Australia, postulates that excessive marijuana use results in cyclical vomiting and abdominal pain.² To date, all previous cases of cannabinoid hyperemesis have been described in adults. We present the first cases of pediatric cannabinoid hyperemesis. In addition, we discuss the puzzling pathophysiologic feature of the syndrome and the associated compulsive bathing.

CASES

Case 1

A 17-year-old Caucasian boy presented with frequent episodes of nausea and vomiting without any clear precipitating factors. He denied any retrosternal burning or epigastric pain. For the past year, he noted that these symptoms frequently recurred and that warm baths and showers temporarily alleviated the symptoms. Medical history was significant for attention-deficit/hyperactivity disorder, asthma, and depression. The patient's medications included bupropion, methylphenidate, albuterol, and fluticasone. He had visited the emergency department (ED) on multiple occasions for these symptoms, and a computed tomographic scan of his abdomen and pelvis did not show any abnormality. He admitted to heavy, daily use of marijuana and tobacco since the age of 14 years.

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Vital signs were normal. His abdomen was soft, mildly tender in the periumbilical area, and without hepatosplenomegaly or abnormal masses. The liver span was 8 cm, and bowel sounds were present. His remaining examination result was unremarkable. Laboratory data included a normal blood count, metabolic profile, hepatic profile, and lipase level. A gastroenterologist evaluated the patient and performed upper endoscopy, which showed esophageal rings but no hiatal hernia, erosions, or ulcers in the stomach or the esophagus. Biopsy specimens showed changes indicative of reflux and were consistent with recurrent nausea and vomiting.

A preliminary diagnosis of cyclical vomiting was made, and it was suspected to be related to his daily marijuana use. Complete abstinence from marijuana was stressed to the patient, and he was placed on omeprazole. During a follow-up examination in 1 month, both the patient and his mother indicated that after ceasing the use of marijuana, the nausea and the vomiting were resolved.

Case 2

An 18 year-old woman presented to the ED with a 2-day history of nausea, vomiting, and epigastric pain. She noted recurrent episodes of these symptoms since age 16 years. For the past 18 months, she had been evaluated in the ED 10 times for these symptoms. Her evaluations included 3 abdominal-pelvic computed tomographic scans, 2 abdominal ultrasounds, numerous laboratory tests, and 2 esophagogastroduodenoscopy. These tests had normal results with the exception of gastritis found on 1 esophagogastroduodenoscopic result, for which she was prescribed omeprazole. Testing for *Helicobacter pylori* infection was negative. Over this same period, she was hospitalized 3 times for persistent vomiting and dehydration. The patient admitted to smoking up to 4 or 5 “blunts” per day and recalled heavier use before the onset of her current symptoms. She also noted that most of her episodes of persistent vomiting occurred during the summer months when she was out of school and had more opportunities to smoke marijuana. She denied using marijuana before the age of 16 years.

The current episode was similar to prior episodes. She denied fever, hematemesis, diarrhea, pelvic pain, or recent travel. Her vital signs were within normal limits, and her physical examination was notable for a soft abdomen with mild tenderness over the epigastrium. Pelvic and rectal examination results were normal. Her potassium level was 3.1 (3.5–5.0) mmol/L, and her urine drug screen result was positive for cannabinoids. Liver function test results, urinalysis findings, lipase level, basic chemistries, and a complete blood count were within normal limits. On review of a recent hospitalization, there were several nursing notes remarking that the patient asked to take frequent showers. Upon questioning the patient, she noted that she would often take as many as 7 hot showers per day during episodes of hyperemesis, as these were the only palliative measure for her vomiting.

On this ED encounter, a presumptive diagnosis of cannabinoid hyperemesis was made. A consulting gastroenterologist

agreed, and the patient was advised to discontinue marijuana use. At 2-month follow-up, she has had no further episodes of vomiting with marijuana cessation.

DISCUSSION

Cyclical vomiting is defined by intermittent episodes of nausea and vomiting separated by symptom-free periods. In these cases, no alternative diagnoses were found after an exhaustive medical workup. Cannabinoid hyperemesis, or a syndrome of cyclic vomiting secondary to chronic cannabinoid use, was first described in 2001 by Allen et al² in Australia. Subsequently, they identified 9 patients whose symptoms were caused by chronic cannabinoid use. It was also noted that 8 of the 9 patients routinely engaged in compulsive bathing or showering in hot water to alleviate their symptoms. Subsequently, there have been a total of nearly 25 cases reported with a similar correlation between chronic cannabinoid use and cyclical vomiting with abdominal pain and heavy long-term cannabinoid use.³⁻⁸

The cause of cannabinoid hyperemesis remains elusive. The traditional therapeutic use of cannabinoids as an antiemetic and the paradoxically related hyperemetic effects of chronic cannabinoid use suggest that similar receptors might be involved in both phenomena and that they are down-regulated during chronic use. Indeed, animal models reveal that the active compound in cannabis (Δ -9-tetrahydrocannabinol) acts via the Cannabinoid type 1 (CB₁) receptors in the brain and that these same receptors are also present in the gastrointestinal mucosa.⁹ Cannabinoid type 1 receptor stimulation by cannabinoids has been shown to suppress peristalsis and gastric emptying in a dose-dependent manner, suggesting a potential pathophysiologic mechanism to explain the toxic effects described previously.^{10,11}

The compulsive bathing in warm water as a means of symptom relief was present in both patients. This singular symptom is present in most cases of cannabinoid hyperemesis, and a few hypotheses have been proposed to explain this unusual but frequently present symptom. One hypothesis concerns the proximity of the CB₁ receptor to the thermoregulatory center of the hypothalamus whereby stimulation of the CB₁ receptor may cause core temperature body changes. The thermoregulatory center dysfunction could be alleviated by warm bathing.⁷ An alternative explanation is that compulsive bathing alleviates a vascular phenomenon. Cannabinoid receptors in the splanchnic circulation cause vasodilation and are activated, for example, in the late-stage cirrhotic patient with resultant vasodilation contributing to hypotension.¹²⁻¹⁴ It is possible that excessive stimulation of the gut cannabinoid receptors also causes vasodilation that may contribute to the pain and the vomiting common in cannabinoid hyperemesis. Cutaneous vasodilation through warm bathing may decrease the circulatory volume available to the splanchnic bed, resulting in a therapeutic “cutaneous steal syndrome.”

We suspect that cannabinoid hyperemesis is an under-recognized syndrome. Because marijuana use is prevalent in the United States and because a large number of users are in the pediatric population, pediatricians and emergency physicians

should consider exploring an in-depth drug history when confronted by a pediatric patient with cyclical vomiting and abdominal pain that defies a thorough gastrointestinal workup.

CONCLUSIONS

We report 2 cases of chronic cannabinoid use in pediatric patients leading to a cyclic vomiting syndrome. With the relatively high prevalence of cannabinoid use in the United States and the increasing interest in the use of marijuana for therapeutic purposes, physicians should be aware of the potential for this syndrome.

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