BRIEF REPORT

Cannabinoid Hyperemesis Syndrome in an Athlete

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Cannabis (marijuana) is an increasingly prevalent substance used in college-aged adults. Cannabinoid Hyperemesis Syndrome (CHS) is 1 outcome of chronic cannabis use, which presents as cyclic intractable vomiting that can be temporarily relieved with hot baths or showers. This case discusses a collegiate football athlete who presents with intractable vomiting, and it underscores the importance of a detailed history to discern CHS from other more common diagnoses. The report will highlight key diagnostic characteristics, pathophysiology, and treatment options for patients with presumed CHS. (J Am Board Fam Med 2021;34:811–813.)

Keywords: **Athletes, Cannabinoid Hyperemesis Syndrome, Cannabis, Case Report, Football, Marijuana, Nausea/Vomiting, Sports Medicine, Substance-Related Disorders, Young Adult**

Introduction

Nausea, vomiting, and abdominal pain are symptoms frequently seen in the general population. It is key to obtain a detailed history and workup when symptoms do not seem consistent with common etiologies. This case report describes an uncommon cause of vomiting and diffuse abdominal pain. It highlights the increasing use of cannabis in the college-aged population and can help a health care provider differentiate cannabinoid hyperemesis syndrome from other causes.

Case Report

A 19-year-old Black male Division I football player with no significant past medical history presented to the emergency department (ED) with 2 days of severe abdominal pain, nausea, and vomiting. The patient presented to student health the day prior and was diagnosed with unspecified nausea and vomiting and prescribed ondansetron. He did not recall any known sick contacts or recent travel history. He answered "never" to screening questions of smoking, alcohol, and drug use. On physical examination in the ED, he was reported pacing inside the room, breathing rapidly, and unable to follow simple commands from the nursing staff. Vital signs included temperature 98.4°F, blood pressure 142/73 mmHg, and heart rate 48 BPM. He received intravenous (IV) 2 doses of haloperidol and IV fluids. His diagnostic workup, including complete blood count (CBC), comprehensive metabolic panel (CMP), lipase, and computed tomography of the abdomen and pelvis with contrast were normal. Urinalysis showed specific gravity >1.030 but otherwise negative. A urine drug screen was not obtained. He was prescribed ondansetron for presumed viral gastroenteritis and discharged. The next day, the symptoms persisted. He presented again to student health and received the same unspecified diagnosis as with the prior visit. He again responded "No" to the use of tobacco, alcohol, and recreational drugs. Ondansetron was switched to promethazine, and he was recommended to adhere to a clear liquid diet.

The primary care team physician later saw him in the athletic training room to discuss symptoms that had been occurring for 6 days. The patient recently transferred from an out-of-state Division I football program and was not well known to the sports medicine staff. Symptoms were not improving with antiemetics but were briefly alleviated by taking hot showers. He was vomiting multiple times per day and had lost 10 kg since his initial preparticipation physical examination 2 weeks prior. On a directed

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history, he reported using a Tetrahydrocannabinol (THC) edible before his initial ED visit, which made his symptoms significantly worse. He reported daily cannabis use in the form of edibles and smoking since the age of 12. Vital signs included temperature 97.3° F, blood pressure 166/105 mmHg, and heart rate 52 BPM. On physical examination, the patient was in mild emotional distress but speaking full sentences and following commands. He was hypovolemic with a capillary refill of 4 seconds, delayed skin turgor, and dry oral mucosa. Lung sounds were clear but mildly labored. He was bradycardic, but no murmurs or friction rub auscultated. The abdomen was soft, nondistended, and had diffuse mild tenderness without rebound. Special tests including obturator test, iliopsoas test, Rovsing's sign, and Murphy's sign were negative.

Based on the patient's history and normal workup, the athlete was diagnosed with Cannabinoid Hyperemesis Syndrome (CHS) in the training room. The team physician discussed supportive treatment measures focusing on oral hydration and refraining from cannabis use in any form. He was advised to start applying topical capsaicin cream to his abdomen for symptom relief, and his promethazine was switched to suppository form. IV access for fluid resuscitation in the training room was unsuccessful. The patient was sent to the ED, where IV fluids were administered. Repeat laboratory workup, including CBC, CMP, and lipase, were normal. A urine drug screen was not completed. He was discharged.

Nine days after symptom onset, the patient had complete resolution of his symptoms. He was counseled on addiction and the risk of recurrence if he resumed cannabis use. He remained asymptomatic and abstinent from cannabis for the subsequent 3 weeks, but he was then suspended from the football team due to unrelated off-campus issues and lost to follow up.

Discussion

Cannabinoids are a group of substances within the cannabis plant, including THC and cannabidiol (CBD). The 2018 National Survey on Drug Use and Health reported nearly 16% of Americans aged 12 years or older had used cannabis at least once in the last year.[1] Despite the inclusion of marijuana, synthetic cannabinoids, THC, and CBD products on the National Collegiate Athletic Association (NCAA) banned substances list, nearly 1 in 4 athletes self-reported using cannabis in the past year. This rate is lower compared with collegiate nonathletes (33% to 39%).[2]

CHS was first reported in 2004 with 10 cases of cyclic vomiting and was defined as a syndrome of chronic, high-dose cannabis use associated with a compulsion for taking multiple hot showers to help alleviate immediate symptoms.[3] Sorensen et al. performed a systematic review (80 case reports, 8 case series; n = 211) and developed a list of most cited diagnostic characteristics (Table 1).[4] There are no pathognomonic physical examination findings. In the studies included in the systematic review, the median age of onset was 24, and the median age of diagnosis was 28. Of these cases, 25.1% used cannabis ≤ 1 year, 36.3% used for 2 to 5 years, 16.8% used for 6 to 10 years, and 21.8% used for ≥ 11 years.

The pathophysiology of CHS is unknown, but there are multiple proposed hypotheses.[5] THC binds to cannabinoid receptor 1 (CB_1), which plays a role in gastric motility.[4] One hypothesis suggests dysregulation of the endocannabinoid system causes decreased gastric motility resulting in vomiting.[5,6] However, a Mayo Clinic case series of 61 patients with CHS were found to have normal gastric emptying (46%), delayed emptying (30%), and rapid emptying (25%).[7] Thus, delayed gastric emptying alone does not seem to be the sole mechanism. CB receptors also cause abnormalities of the hypothalamic-pituitary-adrenal axis, which could result in hyperemesis.[8] Genetic differences in the cytochrome P450 system may also play a role by causing an accumulation of cannabinoid metabolites which

Table 1. Most Frequent Symptoms Associated with CHS Based on Sorensen et al[4] Systematic Review.

Diagnostic Characteristic	%
Severe nausea and vomiting	100
Vomiting that recurs in a cyclic pattern over months	100
Age less than 50 at onset of illness	100
At least weekly cannabis use	97.4
Resolution of symptoms after stopping cannabis	96.8
Compulsive hot baths or showers with symptom relief	92.3
Abdominal pain	85.1
History of daily cannabis use	76.6
History of regular cannabis use for over one year	74.8
Male predominance	72.9

CHS, Cannabinoid Hyperemesis Syndrome.

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may explain why only some chronic cannabis users experience CHS.[8]

The primary treatment for a patient with CHS is abstaining from cannabis.[4,9] Beyond abstinence, there is limited evidence and a lack of high-quality studies regarding treatment options. Common antiemetics, including ondansetron and promethazine, are typically ineffective.[9] Capsaicin cream (0.075%) applied topically to the abdomen has shown some success by causing an effect on TRPV1 receptors that interact with the endocannabinoid system.[4,9] In a systematic review of pharmacologic treatment for CHS, benzodiazepines (primarily lorazepam), haloperidol, and capsaicin were the most effective acute treatment options. Long-term tricyclic antidepressants are most commonly used to help alleviate symptoms, but this assumption is based primarily on low-quality evidence.[9] Hot baths and showers are universally effective in temporarily relieving symptoms.[4,5,9] The reason for this is unclear, but 1 hypothesis referred to as "cutaneous steal syndrome" suggests that hot water causes splanchnic vasodilation that redirects blood flow from the gut to the skin.[10] Currently, there are no consistent first-line medications for the treatment of CHS or cannabis addiction, and prescriptions should be based on the experience and comfort level of the prescribing physician.

Conclusion

This case demonstrates the need for clinicians to consider CHS in the differential diagnosis of patients with unresolved nausea, vomiting, or abdominal pain. This report is the first published case of CHS in a collegiate athlete. With the legalization of cannabis increasingly common, CHS may rise in prevalence despite continued prohibition by the NCAA. Timely recognition can lead to prompt treatment plans, with the foundation being the cessation of cannabis use.

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