Case 2: Weight loss despite tube feeding

A 15-year-old boy was referred by his family physician for a body mass index of 14 kg/m^2. Previously, he had been following the fifth percentile for weight, despite being at the 50th percentile for height. His medical history was notable for eczema, iron-deficiency anemia and bronchitis. He unintentionally lost 4.5 kg over the past year, coinciding with the beginning of high school. He denied abdominal pain, vomiting, headaches, wheezing, reflux, arthritis, rashes and travels, and he passed formed stools daily. He was hungry, ate a varied diet, and denied concerns with body shape, restricting, binging or purging. Although he wished to gain weight, early satiety limited portion sizes. He was not physically active, but had healthy social and academic interests, and an appropriate mood. His mother had depression, two paternal uncles had celiac disease and his father reportedly had a transient malabsorptive problem as a child.

Physical examination was normal aside from obviously low weight. Complete blood count, electrolytes, transaminases, total protein, albumin, thyroid function, antinuclear antibody, rheumatoid factor, ferritin, C-reactive protein, urinalysis, celiac and HIV screens were unremarkable. Esophagogastroduodenoscopy showed mild chronic gastritis without *Helicobacter pylori* infection.

The patient was instructed to consume high-energy foods plus two cans of Ensure (Abbott Laboratories Ltd, Canada) per day. Although consuming an average of 2260 calories per day during the first five weeks, he only gained 1.1 kg. Over the following six months, despite aggressive calorie supplementation with ongoing suggestions from the dietician, he continued to demonstrate suboptimal weight gain, fluctuating between 44 kg and 46 kg. He was, therefore, admitted to hospital where he developed nonbilious and nonbloody emesis. Radiography of his chest and abdomen were unremarkable, as was an upper gastrointestinal contrast study. Nasogastric feeds were started with an intake of up to 3300 calories per day, gaining only 0.3 kg in the first week of admission. A further diagnostic test revealed the diagnosis.

Correspondence (Case 1): Dr Leanne Shamrakov, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario M5G 1X8. Telephone 416-813-5320, e-mail leanne.shamrakov@utoronto.ca

Correspondence (Case 2): Dr Jodie Ouahed, Department of Pediatrics, McMaster Children's Hospital, 1200 Main Street West, Hamilton, Ontario L8N 3Z5. Telephone 905-521-2100, e-mail j_ouahed@hotmail.com

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CASE 2 DIAGNOSIS: PINWORM INFESTATION WITH FOOD AVOIDANCE EMOTIONAL DISORDER

Once the patient was admitted, new morning nausea and emesis suggested another contributing factor. Stool was sent for ova and parasites. All three samples were positive for *Enterobius vermicularis*. Questioning revealed perianal itching of chronic duration. He was treated with one dose of mebendazole. Tape tests eight and 11 days later were still positive, so he received another dose of mebendazole. After treatment, he showed appropriate sustained weight gain through oral feeds; nasogastric tube feedings were stopped. He gained 7 kg over the subsequent month with a controlled daily intake of 3300 calories.

E vermicularis (pinworms) is a common nematode infection, affecting 30% of children worldwide. It is most common in crowded environments, but occurs in all socioeconomic classes and ages with the highest prevalence among five- to 14-year-old children.

Pinworms are small, white roundworms that typically inhabit the cecum, ascending colon, appendix and terminal ileum. Infection is via the fecal-oral route when eggs carried on fingernails, clothes, linen and house dust are ingested; dislodged airborne ova are less common. Larvae hatch in the small intestine and mature into adult worms that mate in the cecum and appendix within 36 to 53 days. At night, pregnant female worms migrate to the perineum and deposit up to 150,000 eggs. The ova embryonate within 6 h, and the cycle repeats.

Pinworm infection rarely causes serious sequelae. Usually asymptomatic, the most common complaint is pruritus ani, with associated sleep interruption, fatigue and secondary infection from excoriation. With high worm burden, abdominal pain, nausea and vomiting may occur. Rarely, children can become anorexic and develop irritability, impaired concentration, enuresis and weight loss. Eosinophilia is not usually observed because tissue invasion is rare. In female patients, pinworms bring colonic bacteria to the perineal area, accounting for recurrent vulvovaginitis and increased urinary tract infections. Worms can also lead to intestinal ulceration, or infect the appendix, genital tract, urinary tract, peritoneum, kidney, liver, spleen and lung.

Pinworm infection may present atypically with rectal bleeding, chronic diarrhea and weight loss, mimicking an inflammatory bowel disease. In a retrospective study by Jardine et al (1), 17% of children presenting with these symptoms were diagnosed with *E vermicularis* infection by colonoscopy, of which 81% had nonspecific colitis histologically.

A definitive diagnosis is achieved by the tape test: adhesive tape is pressed against the perianal area, transferring the eggs so they can be microscopically visualized. For highest yield, testing should be performed at night or early morning before bathing and defecating. One tape test detects 50% of infections, but three tests on consecutive mornings detect 90%. Stool samples seldom reveal *E vermicularis* ova, with a poor sensitivity of 10%, suggestive of a heavy infestation in our patient.

First-line treatment for pinworm infection consists of single doses of mebendazole or albendazole. A single 100 mg dose of mebendazole, or 400 mg of albendazole for children older than two years and 100 mg if younger, should be given to the patient and all household members. Doses are often repeated in two weeks to prevent recurrence. Reinfection is common; good hand hygiene, and frequently changing underclothes, bed linens and nightclothes are encouraged.

The Great Ormond Street (GOS) criteria characterize food avoidance emotional disorder (FAED) by the following features: weight loss, food avoidance, mood disturbance not accounted for by a primary affective disorder, absence of abnormal cognitions or premorbid preoccupations regarding weight and shape, and lack of organic brain disease or psychosis (2). Our patient's presentation fits this profile well. He continually reported wanting to gain weight and feeling 'too skinny', demonstrating no preoccupations or abnormal cognitions regarding weight or shape. The foods he selected while in hospital were uncharacteristic of patients with anorexia, because they contained a high fat content. Although no specific emotional problem was identified, a component of anxiety was suspected given the temporal association with beginning high school and signs of anxiety witnessed by the treating team. In addition, given his role as the 'skinny child' within the family, there was a lot of family pressure for him to eat. Before grade 10, he was obliged to return home from school during his lunch hour to have his food intake monitored. FAED may have evolved from a power struggle between him and his parents in the context of what the patient perceived as unnecessary pressure to eat. Treatment for FAED consists of caloric supplementation in the context of a multidisciplinary team geared toward patients with eating disorders, with weight restoration to promote normal growth and development. If tube feeding is indicated, transition to normal food by mouth should be the eventual outcome, and family-based treatment should be attempted.

CLINICAL PEARLS

- When a patient is unable to gain weight despite caloric supplementation, compounding organic etiologies must be thoroughly investigated, even in the face of pre-existing emotional disorders such as FAED.
- *E vermicularis* is one of the most common nematode infections in children, is diagnosed by the tape test, and requires treatment of the patient and his/her entire household.
- Most cases of pinworms are asymptomatic; however, symptomatic presentations vary widely, from typical pruritis ani to atypical presentations mimicking inflammatory bowel disease. Adolescents may deny symptoms that they regard as embarrassing.

Jodie Ouahed MDCM,
Department of Pediatrics

Natasha Johnson MD MBA FRCPC,
Division of Adolescent Medicine

Herbert Brill MD FRCPC
Division of Pediatric Gastroenterology
McMaster Children's Hospital, Hamilton, Ontario

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RECOMMENDED READING

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