

What's Your Diagnosis?®

Sharpen Your Physical Diagnostic Skills

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HISTORY

A 35-year-old man presents to your office with a worm (shown here) that he found in the toilet after a morning bowel movement. He denies any recent fever, chills, nausea, or vomiting.

He is otherwise healthy and occasionally drinks alcohol. He does not take any daily medications and has no history of significant medical disorders. He works as an entertainer and recently returned from a several-month tour in Southeast Asia.

PHYSICAL EXAMINATION

His vital signs are stable, lung are clear, and heart rate and rhythm are regular. Abdominal examination reveals normal bowel sounds and no masses, guarding, or rebound. Rectal examination shows no excoriations or gross bleeding.

WHAT'S YOUR
DIAGNOSIS?

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What's Your Diagnosis?

ANSWER: ASCARIASIS

This patient had a gastrointestinal (GI) infection caused by *Ascaris lumbricoides*, the most common intestinal roundworm. About 25% to 33% of the world's population is infected with this intestinal nematode, including approximately 4 million people in the United States.¹ *Ascaris* is indigenous to the rural southeast of the United States and is frequently found in high-risk groups, such as refugees and immigrants from Asia and South America, as well as international travelers. Children are more frequently infected than adults and have heavier infestations than adults. Infestation is believed to be associated with poor sanitation, local practices (ie, termite mound eating in Kenya),² and keeping house pets such as dogs and cats.

The worms can range from 15 to 40 cm long and are the largest of the nematodes that affect humans. Once the eggs are ingested, either in food products, contaminated water sources, or soil contaminated with fecal material, they usually hatch in the small intestine. Released larvae penetrate the intestinal wall and migrate via the pulmonary vascular beds and alveoli.

Ova and parasite evaluation of stool specimens is not diagnostic at this stage because eggs are not being released. It takes approximately 40 days from the development of pulmonary tract symptoms until the eggs may be detected in the stool. During this period, the larvae migrate up the respiratory tract and are then swallowed into the GI tract, where they mature, mate, and then deposit eggs in the intestinal tract.

Adult worms may reside in the GI tract for 6 to 24 months, during which time they can cause bowel and biliary tract obstruction, the most common serious complications. They may invade other parts of the GI tract and in rare instances may migrate to involve the

brain and renal system. Between 8000 and 10,000 deaths occur annually, mainly in children as a result of intestinal obstruction or perforation secondary to a high parasitic burden.³

Although many patients remain asymptomatic, some may experience a variety of symptoms, especially with a high worm burden; these include pulmonary (wheezing and coughing) and hypersensitivity effects, pancreatic and hepatobiliary symptoms, and symptoms from intestinal obstruction. A variety of techniques may be used to detect infection, including microscopy of stool, a complete blood cell count to identify eosinophilia, radiographic imaging (with either plain films and/or contrast studies), and serology. Occasionally, as in this patient, the worm is passed via the rectum.

Benzimidazoles (mebendazole and albendazole) are the mainstay of treatment for ascariasis. Other effective agents include levamisole, ivermectin, nitazoxanide, and piperazine citrate. Close follow-up in 2 to 3 months is important because these medications treat the adult worm only and not the larvae.

DIFFERENTIAL DIAGNOSIS

Tapeworms (cestodes) are hermaphroditic worms, some of which use humans as their host and may cause secondary infection, while others are simply parasitic (**Figure 1**). Humans are the definitive host for two main species of *Taenia*, the pork (*Taenia solium*) and beef (*Taenia saginata*) tapeworms; these are found in areas where it is customary to eat undercooked meat.⁴ Although nonspecific GI symptoms may occur (anorexia, nausea, and abdominal discomfort), on occasion passage of tapeworm segments (proglottids) or the feeling of these as they pass through the anus may be



Figure 1 – An adult tapeworm is shown here.

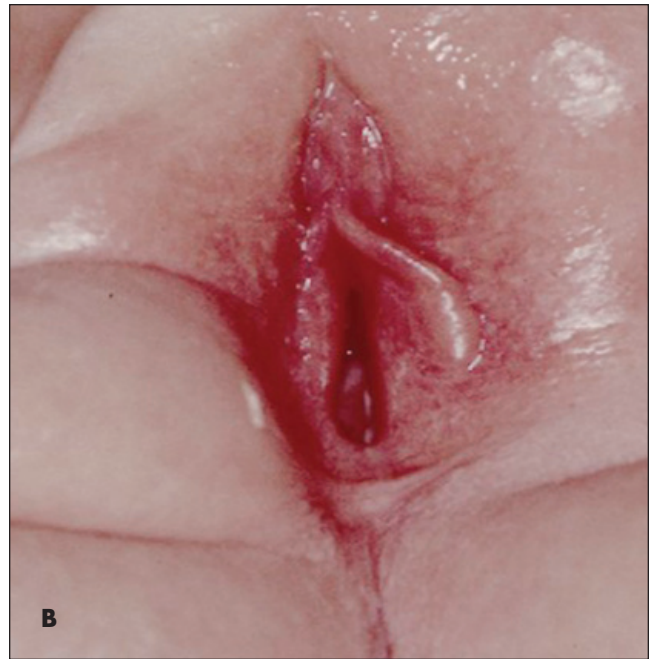


Figure 2 – Female adult pinworms are white, pin-shaped, and 8 to 13 mm long (A and B).

reported. Most human carriers of adult tapeworms are asymptomatic.

Examination of the stool for eggs or tapeworm segments is often used to identify and confirm the diagnosis. Because the sensitivity of the stool examination is limited due to the intermittent passage of eggs and proglottids, other diagnostic tests such as the ELISA and DNA hybridization techniques can be utilized.

Other tapeworms exist, such as the fish tapeworm (*Diphyllobothrium*), which is the largest human tapeworm and is associated with the consumption of raw freshwater fish; the dwarf tapeworm (*Hymenolepis*); and the dog tapeworm (*Dipylidium*), which usually infects domestic cats and dogs. Treatment with an antihelminthic antibiotic is species dependent, and subsequent examination of the stool for eggs should be performed to confirm cure.

Pinworms (*Enterobius vermicularis*) are one of the most common helminthic infections in the United States and Western Europe; they occur in both tropical and temperate climates and are found in all socioeconomic groups. Humans are the only natural host, and children aged 5 to 10 years are the most affected.⁵

Gravid adult female worms deposit eggs on the perianal folds. Eggs are transferred to the oral cavity with contaminated hands after autoinoculation occurs by scratching the perianal area. Infection may be spread by touching contaminated surfaces that are contaminated with eggs, and person to person transmission may also occur by handling contaminated clothing or linens or by ingesting food handled by contaminated hands. Inhalation and secondary swallowing of eggs may also occur.

When hatched, the eggs release larvae into the small bowel with adult worms settling in the cecum and

appendix. The gravid females eventually migrate, usually at night along the perianal skin, and deposit their eggs; the larvae mature in 4 to 6 hours.

The most common complaint of infected patients is pruritus ani or perianal itching, although many infected persons are asymptomatic. If the worm burden becomes very high (the usual worm burden ranges from a few to several hundred), other GI symptoms, such as nausea, vomiting, and abdominal discomfort, may occur. In addition, extraintestinal sites may be involved, such as the nasal mucosa or vulvar area.

Infection is diagnosed by the “scotch tape” test, which involves adherence of the eggs on tape that is placed on the perianal skin on awakening in the morning or at night. White and pin-shaped, female adult worms are 8 to 13 mm long (Figure 2), whereas eggs are 50 to 25 microns and appear as asymmetric bean-shaped structures on microscopy.

Treatment with albendazole or mebendazole is usually curative, although reinfection is common because of other infected household members or a poor hygienic environment. ■

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