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Human Infection with *Hymenolepis diminuta*: Case Report from Spain

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We report a case of *Hymenolepis diminuta* infection in a human. The patient was a 5-year-old girl referred to us through the onset of a cyanotic attack. Treatment with a single dose (10 mg/kg of body weight) of praziquantel was ineffective, but the parasite was eradicated after three treatment cycles with the same drug at dosages of 25 mg/kg/day for 5 days.

Hymenolepis diminuta is a tapeworm that occurs throughout the world. Its principal definitive hosts are rodents. Nevertheless, in rare instances, it can infect humans, when by accidental ingestion of infected arthropods, cysticercoids find their way to the small intestine (15). We report one case of *H. diminuta* infection in a child from Guadalajara, Spain.

A 5-year-old girl, who lived near a grain silo infested with rats, was referred to our Pediatric Unit because, during an episode of apnea induced by crying, she became cyanotic, lost consciousness, and experienced stiffness of the limbs followed by drowsiness and hypotony. The little patient occasionally complained of abdominal pain and anal pruritus. She also endured enuresis and restless nights. Subsequent physical examination, complemented by electroencephalography and skull and chest roentgenograms, was normal. No abnormal readings were found in blood and urine analysis. A Graham test verified absence of *Enterobius vermicularis* eggs. The parasitological examination of concentrated stools (10) revealed spherical, 70-μm-diameter, thick-shelled eggs that contained six central hooklets but no polar filaments (Fig. 1); they were identified as *H. diminuta* eggs. Oral niclosamide (1 g/day for 15 days) was prescribed. Neurological signs were subsequently labeled as cyanotic attacks.

A second parasitologic examination carried out 30 days after diagnosis demonstrated the presence of *H. diminuta* eggs and *Giardia lamblia* cysts. The mother and the only brother were found to evacuate *G. lamblia* cysts as well. During the follow-up visit, the parents admitted that the niclosamide treatment had not been performed as prescribed. At that time, abdominal pain was still present, whereas neurological signs had not reappeared. Consequently, the patient was put on oral metronidazole (375 mg/day) for 7 days, supplemented by a single dose of praziquantel (10 mg/kg of body weight).

One month after completion of the treatment, the child was asymptomatic, but *G. lamblia* cysts and *H. diminuta* eggs were again found in feces. In view of the circumstances, she was given a single dose of tinidazole (1 g) followed up by three cycles of 25 mg of praziquantel per kg/day, with each cycle lasting 5 days. Parasitological examinations carried out 1, 3, and 6 months after the completion of the third treatment cycle were all negative.

Rats and other rodents are usually *H. diminuta*'s definitive targets and natural reservoir. Coprophilic arthropods act as obligatory intermediate hosts (28). When the infected arthropod is eaten by the definitive host, cysticercoids present in its body cavity develop into an adult worm, and its eggs are eliminated in feces (2). Complementing other authors' findings (8, 16), we have pinpointed the likely source of infection in our patient to the proximity of a grain silo infested with rats to the patient's house.

H. diminuta human infection is rather uncommon. Surveys of different populations have reported parasitization rates ranging between 0.001 and 5.5% (5, 17–21, 23, 27), and descriptions of isolated cases are rare indeed (6, 11, 25, 29). In our country, Spain, seven *H. diminuta* human infections have been reported so far, and all of them concerned children (4, 12, 30, 31). According to the data obtained from a Medline search, in the United States, 48 cases have been reported since 1965 (7, 8, 13, 14, 16, 22).

Although *H. diminuta* infection is often asymptomatic (2, 3), abdominal pain (2, 3, 8), irritability (2, 30, 31), and pruritus (2) have been associated with this condition. *H. diminuta* infection may cause eosinophilia (3), a finding that was not detected in our patient. The relationship between abdominal discomfort and *H. diminuta* infection was difficult to establish, because that symptom disappeared way ahead of the cestode's eradication. The conjectural presence of *G. lamblia* that may have gone undetected during the first parasitological examination is also a well-known cause of abdominal pain in infected individuals (9). Irritability might have given rise to the cyanotic attack.

Praziquantel is the drug of choice for treatment of *H. diminuta* infection (2), but niclosamide is also effective (13, 14). Our patient was initially prescribed niclosamide, but the treatment regimen was not respected. A single dose of praziquantel (10 mg/kg) failed to annihilate the tapeworm. Currently used therapeutic handbooks do not discuss *H. diminuta* treatment (1, 24), perhaps because of its low prevalence. We believe that in the present case, a single 25-mg/kg praziquantel dose, as recommended for *Hymenolepis nana* infection (1, 24), followed by a new parasitological examination of stools should have been the next and most appropriate management step; instead, the pediatrician decided to prescribe a more prolonged treatment to ensure eradication. Given the lack of data about praziquantel treatment (1, 24, 26), we suggest that every case of *H.*

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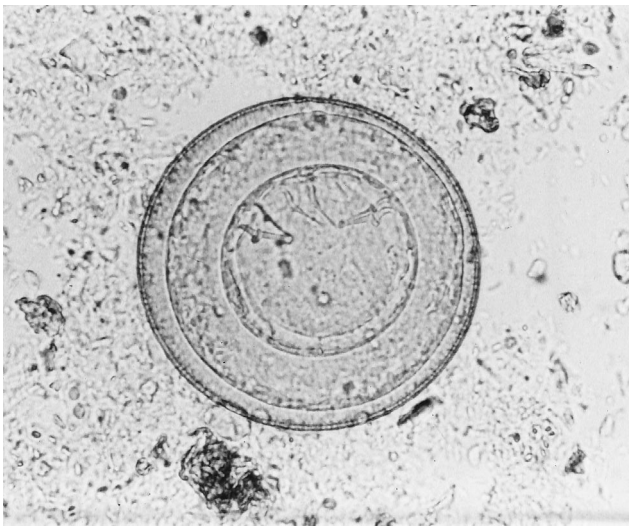

FIG. 1. *H. diminuta* egg at ×40 magnification.

diminuta infection be reported, especially data regarding treatment protocols and parasitological responses.

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