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Importance of Considering *Trichuris trichiura* Infection in Infant Presenting with Acute and Substantial Bloody Diarrhea: A Case Report and Literature Review

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Trichuris trichiura (whipworm) is a soil-transmitted helminthes (STH). It commonly causes parasitical infection worldwide, but occurs most frequently in children of developing countries. Infection of the gastrointestinal tract by *T. trichiura* in children can lead to impairments in physical, intellectual, and cognitive development. Most cases are asymptomatic, and as a result, acute and substantial bloody diarrhea resulting from infection with *T. trichiura* can be overlooked. With progressive socioeconomic development and hygiene improvement, the prevalence of trichuriasis has been declining quickly in Taiwan. Here, we report a sporadic case of an 11-month-old female infant who presented with fever and substantial bloody diarrhea. Microscopic examination showed that her stool contained eggs typical of *T. trichiura*. She recovered completely with mebendazole treatment.

Key words: bloody diarrhea, mebendazole, soil-transmitted helminthes, trichuriasis, Trichuris trichiura

INTRODUCTION

Soil-transmitted helminthes (STHs) are a well-characterized class of parasitical intestinal worms, and cause the most common parasitic infection worldwide.[1] Approximately 2 billion people are infected with one or more of these STHs, accounting for up to 40% of the global morbidity from infectious diseases.[2] The species of STHs that infect humans, including the whipworm *Trichuris trichiura*, the large roundworm, *Ascaris lumbricoides*, and 2 species of hookworm, Necator americanus and Ancylostoma duodenale, are found predominantly in the tropical and subtropical regions of Asia.[3] STH infections can contribute to malnutrition and iron-deficiency anemia, leading to poor growth, reduced physical activity and impaired learning ability during childhood.[4] Moreover, intestinal obstruction, dysentery syndrome, fever, dehydration, vomiting and colitis have been reported as other major complications associated with STH infections.[5] Thus, STH infections represent a major public health problem worldwide.

Trichuriasis is caused by various species of *Trichuris*. Most human cases are caused by *Trichuris trichiura*, while other species of *Trichuris* are also reported to infect animals, but not humans.[6] In countries where trichuriasis is endemic, it poses a threat to the healthy growth and development of millions of preschool children. In developed countries, a precipitous decline in prevalence has been observed since the 1960s with the introduction of national treatment programs as well as social and economic development.[7] Even so, a few sporadic cases have unpredictably occurred in non-endemic areas, the causes of which have not yet been completely elucidated.

Unless heavily infected, most patients with *T. trichiura* infections are asymptomatic. Children are often more seriously affected than adults. Although blood loss can be a feature of *T. trichiura* infection, it is less prominent than in hookworm infection. However, intestinal bleeding may potentially lead to severe or even life-threatening anemia. Here, we describe the case of an 11-month-old infant who presented with fever and substantial bloody diarrhea. Stool examination indicated *T. trichiura* infec-

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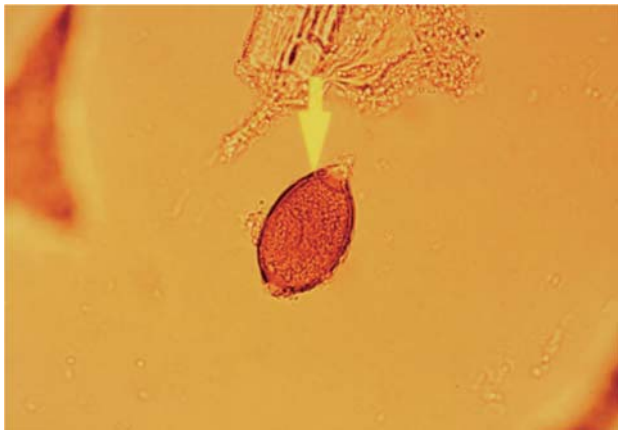

Fig. 1 Fecal smear revealed eggs with transparent bipolar plugs

tion. Although a variety of pathogens may cause bloody diarrhea, an accurate diagnosis of a parasitical infection requires careful examination of medical history, an astute physical examination, performance of appropriate laboratory tests, and, in particular, a high index of suspicion.

CASE REPORT

An 11-month-old native infant living in a rural area of southern Taiwan, without remarkable previous illness, presented with intermittent fever, substantial bloody diarrhea, and abdominal distension that had already lasted for 2 days. The primary caregiver was her grandmother. Her educational level was primary school and socioeconomic status was middle. Physical examination indicated a body temperature of 39.4°C, a pulse rate of 162 beats/min, and a respiratory rate of 40 breaths/min. She was irritable, crying, and looked unwell. Examination of her head, neck, chest, and cardiovascular system was unremarkable. Laboratory investigation revealed a normal white blood cell count (9800/μL) without eosinophilia, a hemoglobin level of 10.4 g/dL, a platelet count of 284000/μL, and a high level of C-reactive protein (10.23 mg/dL). Electrolytes, liver and renal functions were normal. Her personal and travel history were unremarkable including no animal contact. Stool culture was negative. However, immunoglobulin E level was elevated at 55 IU/mL (normal range within < 8 IU/ml for age less 1 year). Microscopic examination of a stool specimen showed numerous red blood cells and several yellowish-brown, thick-shelled eggs with 2 polar plugs (Figure 1). The size (50×20 μm) and morphology of these eggs suggested a diagnosis of *T. trichiura* infection. After oral treatment with 100 mg mebendazole twice a day for 3 days, the patient's fever subsided, her distended abdomen improved, her stools were no longer loose, and neither blood nor eggs were found in her stool. She was discharged on the fifth day, and no sequelae were noted.

DISCUSSION

An estimated 1.05 billion persons harbor the whipworm.[8] Trichuriasis infections are found predominantly in tropical and subtropical regions of Asia, especially in China, India, and Southeast Asia, and the prevalence may reach up to 95% among children in some regions.[8] The Chinese national survey conducted between 1988 and 1992 estimated 212 million cases of trichuriasis in China.[9] With the introduction of national control programs, an improvement in the socioeconomic status, and significant supplies of agricultural chemicals, the incidence of trichuriasis in Taiwan has dramatically declined.[10] However, a few sporadic cases, similar to the one reported here, have occurred in industrialized nations, such as the USA and the UK.[11,12]

Trichuriasis is caused by infection of the human intestinal tract resulting from the ingestion of eggs from contaminated water or food. The eggs hatch in the small intestinal crypts for up to 14 days before completing maturation in the large intestine. Adult worms are found in the cecum and adjacent portions of the large intestine, and shed their eggs in the feces. *T. trichiura* begins to produce eggs in approximately 30 to 90 days. Adult female worms oviposit into the cecum at a rate of 5000 to 7000 eggs per day and can do so for up to 5 years. *Trichuris* eggs have not started to develop and are not infectious when they are excreted. It may take 2 weeks or longer for these eggs to begin embryogenesis and thus become infectious.[13] Under ideal conditions, eggs can remain viable for years and therefore can occasionally be identified by fecal examination. Moreover, adult worms are occasionally and unexpectedly seen in colonoscopy views.[14] Colonoscopy may help in the diagnosis of *T. trichiura* infection in patients with negative stool examination results.

Clinical manifestations of trichuriasis are often asymptomatic. However, once patients are heavily infected, they may present with abdominal pain, distention, nausea, vomiting, flatulence, headache, body weight loss, malnutrition, anemia, poor appetite, and urticaria.[6] Acute and substantial bloody diarrhea is often not associated with infection because most case reports of patients with *T. trichiura* infection describe chronic bloody stools or

chronic diarrhea.[14-16] Bloody stools may cause severe or even life-threatening anemia, leading to clubbed fingers, poor growth, and developmental and cognitive deficits especially in children or others with significant exposures.[6] None of these symptoms were noted in this case during the early stage of this infection. Previous reports have shown that egg counts and hemoglobin levels are significantly correlated, and this may explain the mild anemia present in the current case.[17] Intestinal bleeding is thought to arise from adult worms using a spear-like projection at their anterior end to attach to the intestinal lining, which leads to intestinal mucosal ulceration.[18] This may have lead to the clinical presentation of massive bleeding in the current case. However, the prevalence and intensity of infection tend to be low in children aged <24 months, but the worm burdens are generally very light in this group.[19,20] When patients with *T. trichiura* infection are asymptomatic or exhibit only subtle signs and symptoms, clinicians need some index of suspicion, such as local epidemiology or country of origin, to request a fecal examination. In these cases, a correct diagnosis of *T. trichiura* infection can be made if the oval, yellowish-brown, thick-shelled eggs with 2 polar plugs are identified (Figure 1).

Sources of the infection are partly because of poor local hygiene, and only the safe disposal of human feces can interrupt transmission. A local investigation in Taiwan showed that the infection rate of foreigners from Southeast Asia with *T. trichiura* was 0.54% based on the presence of eggs in stool.[21] Therefore, eggs of *T. trichiura* might be harbored in the feces of immigrants or travelers from endemic areas, and the present patient may have come into contact with them, for example, through contaminated soil or food, and the infectious eggs invaded her digestive tract via her hands.

Mebendazole (100 mg twice a day for 3 days) or albendazole (400 mg for 3 days) is the treatment of choice for trichuriasis.[15] These drugs can also facilitate the large-scale prevention of morbidity in children living in endemic areas. Pregnancy and children less than 2 years of age are relative contraindications since safety has not been established in mebendazole. However, World Health Organization in 2002 held an informal conference to review the treatment of mebendazole and albendazole in children under 24 months for soil-transmitted helminthiasis. A recommendation was made for mebendazole to use 100 mg twice a day for three days or a single dose of 500 mg, and albendazole to use a reduced dose of 200 mg in children aged 12–24 months. Under aged 12 months, dosage of mebendazole or albendazole was still controversial. We took into consideration of our case's age nearly to 12 months and the therapeutic dosage in our case was possibly acceptable. After deworming, education programs addressing good hygiene (e.g., hand washing and washing raw foods before eating), adequate disposal of human fecal matter, good sanitary conditions, and the need for boiling water before drinking can also help prevent re-infection and interrupt transmission.[15] Importantly, children should be taught not to eat soil and to wash their hands after playing with pets and after outdoor activities.

In conclusion, when children present with intermittent fever and substantial bloody diarrhea, clinicians should consider the possibility of parasitic infections such as trichuriasis. The definitive diagnosis of trichuriasis is the identification of worm eggs in the stool sample. Anthelmintic medications, including mebendazole and albendazole, can effectively eradicate these worms and reduce morbidity amongst children. A correct diagnosis and prompt appropriate treatment require careful evaluation of the medical history, an astute physical examination, performance of appropriate laboratory tests, and, in particular, a index of suspicion.

DISCLOSURE

All authors declare no competing financial interests.

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