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CASE REPORT

Strongyloidiasis Associated with Severe Anemia: A Case Report in Taiwan

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Strongyloidiasis is caused by infection with the helminth, *Strongyloides stercoralis*. The life cycle of *S. stercoralis* in the host could last decades owing to autoinfection. Most symptoms of strongyloidiasis are nonspecific and may involve the skin, respiratory tract, or gastrointestinal tract. Severe anemia is a less frequently reported symptom of strongyloidiasis. The prevalence of strongyloidiasis is low in Taiwan, and sporadic cases have been previously reported. We present a case of strongyloidiasis in an 82-year-old woman diagnosed by microscopic examination of stool, presenting with severe normocytic anemia. After treatment with the antiparasitic medication, ivermectin, and blood transfusion, her anemia improved. Therefore, parasite infection should be considered in immunosuppressed patients despite atypical laboratory results. Physicians should be aware of the rare incidence of strongyloidiasis in Taiwan and consider it as a possible differential diagnosis for anemia.

Key words: Anemia, helminth, *Strongyloides stercoralis*, strongyloidiasis

INTRODUCTION

Strongyloides stercoralis, a helminth predominantly distributed in tropical or subtropical regions, causes strongyloidiasis. The overall prevalence was estimated to be 10%–40%, with at least 100 million people infected worldwide in endemic regions.[1] The exact prevalence of strongyloidiasis in Taiwan remains unknown. The principal host of *S. stercoralis* is humans.[2] Human infections with *S. stercoralis* occur mainly through contact with contaminated soil or sewage. Nosocomial and person-to-person transmissions have also been reported.[1,3]

The life cycle of *S. stercoralis* can be completed within a human (definitive host) through autoinfection.[2] After exposure to possible infection sources, skin lesions are usually the first present due to the initial penetration of the larvae into the skin. After coursing through the bloodstream or lymphatic drainage, the filariform larvae translocate to the lungs and cause respiratory tract symptoms such as dry cough. As the larvae ascend from the bronchial tree and enter the gastrointestinal (GI) tract, they become adult female worms and deposit eggs. The eggs hatch into rhabditiform larvae, resulting in symptoms such as diarrhea, constipation, abdominal pain, or anorexia. Patients usually develop GI symptoms 3–4 weeks after infection. *S. stercoralis* can initiate a new life cycle in the host through autoinfection as rhabditiform larvae turn into filariform larvae in the GI tract and penetrate the intestinal wall or perianal skin. Some immunosuppressed patients may develop severe complications such as hyperinfection syndrome and disseminated strongyloidiasis.[4,5] Severe anemia is a less common symptom of strongyloidiasis. Despite the rare incidence of strongyloidiasis in Taiwan, physicians should be aware of the risk and consider it as a possible differential diagnosis for anemia.

CASE REPORT

The patient was an 82-year-old Taiwanese woman who presented to our emergency department with progressive general weakness, watery diarrhea, and malaise for a week.

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She had a history of hypertensive cardiovascular disease with medication control. Physical examination revealed grade III pitting edema in her extremities. A digital rectal examination revealed mixed hemorrhoids without active bleeding or blood clots. Erythematous changes, localized erythema, and tenderness were observed in the perianal region. Her hemoglobin level was 6.5 g/dL with a normal mean corpuscular volume of 85 fL [Table 1]. Stool examination revealed occult blood 2+ without white blood cells, and identified *S. stercoralis* larvae. Two units of packed red blood cells were transfused for normocytic anemia. No specific findings were noted in the pulmonary or cardiovascular system. Other blood examinations revealed a platelet count of 345 × 10^3/μL and a white blood cell count to be 13.95 × 10^3/μL (neutrophils 82.3%; lymphocytes 9.5%; eosinophils 1.7%). The Figure 1a and b showed several rhabditiform larvae of *S. stercoralis* under microscopic view, with a length of approximately 200 μm and a short buccal cavity.

The patient received antiparasitic medication: oral ivermectin 15 mg (200 μg/kg/day) stat, then 12 mg QD for 2 days; combined with intravenous ceftriaxone 2 g QD. Three days later, the hemoglobin level was 8.5 g/dL. Rebound eosinophilia (10.1%) was also detected. Repeated stool examinations revealed no larvae under a microscope. No GI tract endoscopic examinations were performed due to her old age. Her symptoms of general weakness and abdominal discomfort improved, and she was discharged.

DISCUSSION

The prevalence of *S. stercoralis* infection in Taiwan remains unknown. Sporadic cases have been reported over the past few years.[2,6] Most cases presented with diarrhea, cough, and skin rash. The patients were usually infected through contact with contaminated soil, but less than half of the cases could recall precise contact history.[2,7] The patient and her family denied farming, gardening, or contacting contaminated soil or sewage. The patient had never previously lived, long-term, in a care facility. In this case, the initial source of the infection was intractable. Based on the life cycle of *S. stercoralis* and the patient's clinical symptoms, the timing of the initial exposure was at least 3 weeks prior or even longer. The chronic infection could persist for decades if the patient is asymptomatic.[1]

Table 1: Laboratory test results (hematology) of the patient

	Day of admission	3 days after admission
Hemoglobin: 12.0-16.0 g/dL	6.5	8.5
Leukocyte count: 4.50-11.00×10^3/μL	13.95	8.92
MCV: 79.0-100.0 fL	85	86
Platelet: 150-400×10^3/μL	345	414
Neutrophil: 40.0%-74.0%	82.3	74.5
Eosinophil: 1.0%-7.0%	1.7	10.6
Na: 134-145 mmol/L	133	137
K: 3.5-5.1 mmol/L	3.4	3.5
BUN: 7-25 mg/dL	21	7
Cr: 0.5-0.9 mg/dL	0.8	0.4
AST: −40 U/L	14	16
CRP: −0.8 mg/dL	2.01	6.25

MCV=Mean corpuscular volume; BUN=Blood urea nitrogen; AST=Aspartate aminotransferase; CRP=C-reactive protein

The normocytic anemia may have been caused by chronic inflammation due to the autoinfection of *S. stercoralis*. During autoinfection, repeated penetration of the GI tract by the larvae can result in edema, mucosal hypertrophy, ulcers, gastritis, and erosions, leading to chronic inflammation with normocytic anemia, as observed in our patient. Endoscopy may help diagnose strongyloidiasis in patients with persistent GI symptoms of unknown etiology.[8]

The current diagnostic tools for strongyloidiasis include stool examination, bronchoalveolar lavage, and serology. Stool examination is the traditional method for diagnosing strongyloidiasis, but with low sensitivity. Delayed GI tract symptoms and intermittent excretion of larvae usually make stool examination positive 3–4 weeks after infection. Repeated stool examinations can increase sensitivity.[1] Serological tests such as enzyme-linked immunosorbent assays detect IgG antibodies in response to *Strongyloides* species, however, its limitations include the cross-reactivity of other soil-transmitted helminths and insufficient antibodies produced by the patient's immune system. Molecular analyses, such as polymerase chain reaction (PCR), have higher sensitivity than stool examination. However, DNA extraction from samples is crucial for PCR results.[1]

Eosinophilia was found in approximately two-thirds of the cases of strongyloidiasis.[9] However, our patient had a normal initial eosinophil count and an elevated eosinophil count after

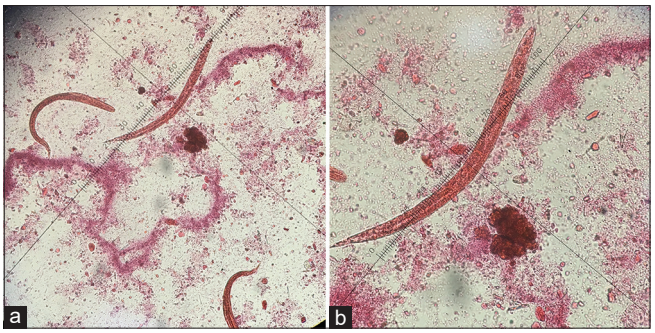

Figure 1: (a) Microscopic examination of *S. stercoralis* larva in a stool sample (×100) and (b) Microscopic examination of *S. stercoralis* larva in a stool sample (×200). *S. stercoralis: Strongyloides stercoralis*

treatment [Table 1]. However, the patient's immune status can affect the ability to produce eosinophils. Patients being immunosuppressed, such as elderly people like our patient, could have a normal range of eosinophil counts even when they are currently infected or have hyperinfection syndrome. [1] The rebound of eosinophils is probably due to the restoration of the patient's immune system.[10]

CONCLUSION

Sporadic cases of strongyloidiasis have been reported in Taiwan. Patients usually present with nonspecific and general symptoms. Normocytic anemia is a less frequently reported symptom that may be due to chronic inflammation. A variety of diagnostic tools require careful interpretation so as not to miss the diagnosis. Although the incidence of strongyloidiasis in Taiwan is low, physicians should consider it a possible differential diagnosis for anemia.

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Local Ethics Committee of the Institutional Review Board of Tri-Service General Hospital (C202005178). Informed written consent was obtained from the patient before her enrollment in this study.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Data availability statement

All data generated or analyzed during this study are included in this published article.

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Conflicts of interest

There are no conflicts of interest.

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