CASE STUDY: FATAL STRONGYLOIDIASIS ASSOCIATED WITH HUMAN T-CELL LYMPHOTROPIC VIRUS TYPE 1 INFECTION

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Abstract. A case of fatal strongyloidiasis associated with human T-cell lymphotropic virus type 1 (HTLV-1) infection is described in a 45-year-old West Indian man living in an area endemic for both strongyloidiasis and HTLV-1 infection. Clinical presentation was typical with severe diarrhea, vomiting, and progressive weight loss. Stool microscopy revealed Strongyloides stercoralis rhabditiform larvae. Despite treatment with thiabendazole, the patient died. Autopsy findings revealed severe ileocolitis due to Strongyloides larvae, right subdiaphragmatic pyogenic abscess, and severe pleuritis of the right lower lobe of the lung. This case illustrates that despite effective antihelmintic therapy, mortality is still high in patients with the hyperinfective state of S. stercoralis. Thus, in patients in areas endemic for both Strongyloides infection and HTLV-1, or in immigrants from these areas, repeated stool microscopy is indicated in patients positive for HTLV-1.

INTRODUCTION

Strongyloidiasis is an intestinal nematode infection caused by *Strongyloides stercoralis* and occasionally *S. fuellerborni*. It has a worldwide geographic distribution, but it is endemic in the tropics and the subtropical regions of the world in places with hot and humid climates. It infects 35% of some tropical populations. Despite the endemcity, most patients are chronic asymptomatic carriers.

Enhanced proliferation of the parasite occurs in immunocompromised hosts, especially in patients with defective T-cell function and in patients receiving immunosuppressive therapy. This hyperinfective state is associated with massive invasion of the gastrointestinal and respiratory system and may result in widespread dissemination into other body organs or in invasive strongyloidiasis. Attention has been given to invasive strongyloidiasis with the emergence of retroviruses, especially human T-cell lymphotropic virus type 1 (HTLV-1) and human immunodeficiency virus (HIV). The hyperinfective state of *Strongyloides* is enhanced by HTLV-1 due to its immunomodulatory effects.

In epidemiological studies, prevalence of *S. stercoralis* is higher in HTLV-1–positive patients than in HTLV-1–negative patients; HTLV-1 seropositivity, as assessed by serologic techniques, is also significantly more common in people infected with *S. stercoralis*, compared with *S. stercoralis*-negative patients.

CASE REPORT

A 45-year-old West Indian man residing in the Commonwealth of Dominica presented with a 3-day history of diarrhea and vomiting. He had 8–10 watery mucoid stools daily. There was associated epigastric pain. He was a farmer and practiced unprotected heterosexual sex. He had been admitted 1 year previously and treated for enterocolitis due to strongyloidiasis. At his previous admission 1 year before, his HIV serology, as assessed by enzyme-linked immunoabsorbent assay (ELISA), was negative, but he was positive for HTLV-1, as confirmed by Western blot test. He received a 5-day course of thiabendazole 1.5 g twice a day. He responded well to treatment but was lost to follow-up after he was discharged from the hospital.

Examination findings at readmission revealed a wasted man with significant dehydration. His temperature was 100°F (37.8°C), pulse 90/min, blood pressure 100/60, and respiratory rate 24/min. He was not icteric, and there was no significant lymphadenopathy. The abdomen was soft and flat with epigastric tenderness; the liver, spleen, and kidneys were not palpable. The bowel sounds were hyperactive, and rectal examination revealed soft, mucoid stool with no blood. There were few crepitations in the lower zone of the right lung field, but other systemic findings were normal.

Stool microscopy showed a heavy load of *S. stercoralis* rhabditiform larvae. Other laboratory investigation findings were white blood cell count, 8.5 × 10^9/L with a normal differential count and 2% eosinophils. Platelet count was 254 × 10^9/L, hemoglobin 15.0 g/dL, and erythrocyte sedimentation rate 6 mm/hr (Westergreen). The serum potassium level was 3.5 mEq/L, blood urea nitrogen 47.5 mg/dL, and creatinine 2.8 mg/dL. Other electrolytes were normal. The total protein and albumin were low, at 5.2 and 2.9 g/dL, respectively. Transaminases were mildly elevated, with alanine aminotransferase (ALT) = 94 IU/L and aspartate transaminase (AST) = 119 IU/L. The serum bilirubin, alkaline phosphatase (PT), and partial thromboplastin time (PTT) levels were normal. Random blood sugar was 153 mg/dL. Chest radiograph showed infiltrative changes in the right lower lobe. Electrocardiogram was normal. Repeat HIV serology by ELISA on 2 occasions were negative. He was adequately rehydrated with intravenously administered fluid; hypokalemia was corrected; and he began therapy with intravenously administered antibiotics and orally administered thiabendazole.

He died on the third day of hospital admission as a result of sepsis. Autopsy showed severe ileocolitis due to *S. stercoralis*, pleuritis of the right lower lobe of lung, and a right subdiaphragmatic pyogenic abscess.

DISCUSSION

Disseminated or invasive strongyloidiasis is an important cause of morbidity and mortality in immunocompromised patients. The mortality rate was as high as 86% among 89 patients reviewed by Igra Siegman and others.

This patient was HTLV-1 seropositive, but he did not demonstrate any other form of immunosuppression. He re-
sided in a zone endemic for both HTLV-1 virus and *Strongyloides*. It is known that HTLV-1 has a distinctive geographical distribution, which is best described in southern Japan and the Caribbean, where it is endemic, and *Strongyloides* larvae were present in 3.7–5.3% of stool specimens analyzed in the laboratory in Dominica by use of the un-concentrated technique. The severe ileo colitis seen in this patient may have been due to reinfection, the result of a delay in accessing medical care or the result of failure to eradicate the parasite after his previous 5-day course of thiabendazole therapy; the therapeutic efficacy of thiabendazole may be reduced in HTLV-1 infection. Both HTLV-1 and *Strongyloides* are strong comorbid infections, and the immunomodulatory effect of the HTLV-1 virus enhances the hyperinfective state of *Strongyloides*. Low levels of immunoglobulin (Ig) G and IgE are found in patients with HTLV-1 with or without strongyloidiasis. Neva and others postulated that HTLV-1–infected activated T cells produce interferon gamma, which downregulates interleukin 4 (IL-4) with subsequent reduction of serum IgE levels. The impaired IgE responses and IL-4 downregulation may contribute to a severe disease and failure to respond to treatment of *Strongyloides* infection in HTLV-1–infected people. This patient had a poor eosinophil response, with 2% eosinophilia. Eosinophils might play an important role in protecting the host against fulminant strongyloidiasis; eosinopenia is associated with a poor prognosis. Other immunologic abnormalities previously documented in severe strongyloidiasis includes lower levels of IgA and IgM and low eosinophil count. The loss of protective immunity enhances the autoinfection and hyperinfective cycle of strongyloidiasis. This case supports other documented cases in literature of fatal strongyloidiasis in HTLV-1–infected patients.

This patient died as a result of sepsis after subdiaphragmatic pyogenic abscess. Sepsis is reported to be a major contributor to mortality in most case reports of hyperinfective strongyloidiasis. The invasive filariform larvae may migrate from site of severe ileocolitis into other body tissues, carrying along with them pyogenic organisms, as suggested by Longworth and Weller.

Hyperinfective *Strongyloides* should be suspected in patients with epidemiologic predisposition, such as travelers or immigrants from the tropics and sub tropics presenting with unexplained sepsis, unexplained weight loss, and gastrointestinal symptoms, despite a normal eosinophil count. Eosinophilia commonly seen in parasitic infestations may be absent, as was seen in this patient. Repeated stool microscopy may be needed for diagnosis because there might be intermittent shedding of larvae, or duodenal aspirate microscopy may be performed when specific and sensitive serologic assessment is not available. Once strongyloidiasis is detected, adequate treatment with thiabendazole, albendazole, or ivermectin is indicated. In situations where worm eradication is impossible or reinfection is probable, short monthly courses of antihelmintic therapy seems effective in averting recurrent systemic illness. This decreases the worm load in predisposed patients, especially those infected with the HTLV-1 virus. We conclude that the immunosuppression caused by HTLV-1 could predispose patients to invasive strongyloidi- asis, resulting in death, as illustrated by this case.