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Case report

Survival in a case of diffuse alveolar hemorrhage due to *Strongyloides stercoralis* hyperinfection

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ABSTRACT

Strongyloides stercoralis is an intestinal nematode endemic to tropical and sub-tropical regions. Although infection is typically asymptomatic or self-limited, immunocompromised individuals can develop a severe form of disease marked by hyperinfection. Pulmonary involvement accompanies hyperinfection in a majority of cases, though manifestations range from asymptomatic infiltrates to diffuse alveolar hemorrhage (DAH) and respiratory failure. When complicated by DAH, the hyperinfection syndrome is usually fatal. We report a case of a 65-year-old Guatemalan woman with chronic inflammatory demyelinating polyneuropathy (CIDP) treated with chronic steroids who presented with *Escherichia coli* urosepsis. She was initially treated with antibiotics and corticosteroids. She subsequently developed DAH due to disseminated strongyloidiasis. She was treated with oral and subcutaneous ivermectin and had complete recovery.

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1. Case report

A 65-year-old Guatemalan woman presented to the hospital with two days of nausea, vomiting, and diarrhea. Her medical history included CIDP, requiring 40–60 mg of prednisone daily. Twenty years previously, she emigrated from Guatemala but visited her native country annually. Medications on admission included prednisone 60 mg daily. She had a prior positive *Strongyloides* serology (titer 2.11 index value) and peripheral eosinophilia (3400/mm^3) without documentation of prior anti-helminthic treatment.

On presentation, her vital signs were: blood pressure 94/72 mmHg, heart rate 158 beats/min, respiratory rate 26 breaths/min, oxygen saturation 94% on 2 L/min O2 via nasal cannula, and temperature 37.0 °C. Physical exam revealed rigors, dry mucous membranes, clear lung fields, and suprapubic tenderness. Her WBC count was 22,000/mm^3 (19% bands and 0% eosinophils). Urinalysis revealed 22 WBC/high powered field. In the emergency department, she received IV fluids, ciprofloxacin, metronidazole, and methylprednisolone 100 mg IV. She was admitted to the intensive care unit (ICU) and started on piperacillin-tazobactam. Methylprednisolone was discontinued and prednisone 30 mg twice daily was begun. Admission blood and urine cultures grew *Escherichia coli*. Stool studies were negative for enteric pathogens. On hospital day 2, her hemodynamic status improved and she was transferred to the medical ward.

On hospital day 5, she developed progressive hypoxemia. Contrast-enhanced chest CT identified small bilateral pleural effusions and diffuse perihilar and peripheral air space opacities. Chest X-ray on hospital day 8 demonstrated progressive bilateral infiltrates (Fig. 1). Bronchoscopy demonstrated blood throughout the tracheobronchial tree. Serial aliquots of bronchoalveolar lavage (BAL) fluid revealed persistently hemorrhagic fluid. She was intubated and transferred to the ICU. Repeat WBC count was 24,000/mm^3 (7% bands and 13% eosinophils), platelets 348,000/mm^3, and prothrombin time 13.9 s. Given bronchoscopic evidence of DAH, she was treated with 1 g of methylprednisolone daily for two days. Prior to methylprednisolone, she received a dose of oral ivermectin (200 mcg/kg). The following day, BAL fluid returned positive for *Strongyloides stercoralis* (Fig. 2). Corticosteroids were discontinued.

Abbreviations: BAL, bronchoalveolar lavage; CIDP, chronic inflammatory demyelinating polyneuropathy; DAH, diffuse alveolar hemorrhage; ICU, intensive care unit; WBC, white blood cell.

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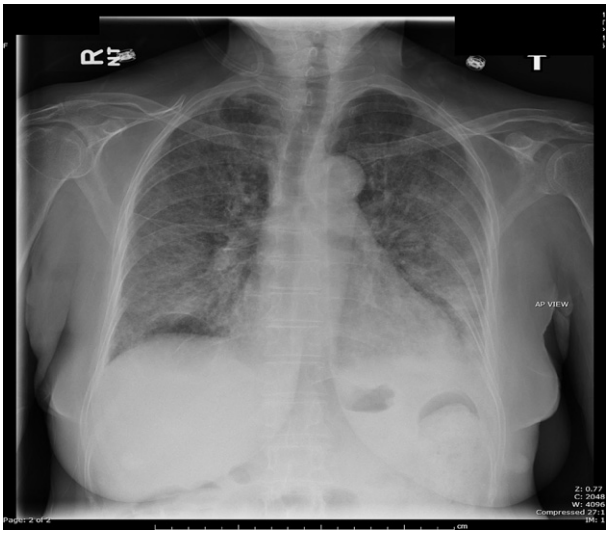

Fig. 1. AP chest X-ray demonstrating diffuse patchy opacification.

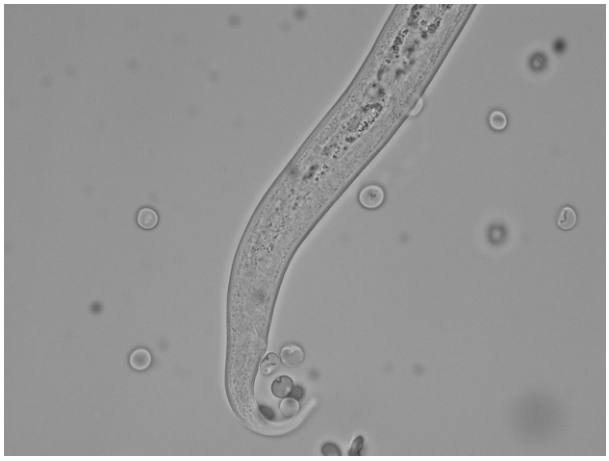

Fig. 2. Strongyloides filariform larva from BAL, 100× magnification.

She received subcutaneous ivermectin (200 mcg/kg) every other day for 4 doses. Repeat bronchoscopy on hospital day 9 showed resolving hemorrhage. Serologies were negative for ANCA, anti-GBM, ANA, HIV, and HTLV-1. Stool studies were monitored to document *Strongyloides* clearance. Our patient improved over the next 10 days and was discharged in good condition to complete a total of 4 weeks of daily oral ivermectin therapy.

2. Discussion

S. stercoralis, an intestinal nematode endemic to Africa, Southeast Asia, Central and South America, has a complex life cycle involving the pulmonary and gastrointestinal systems.[1] Infection is often asymptomatic. Symptomatic disease ranges from nonspecific cutaneous, gastrointestinal, and respiratory manifestations to an often fatal hyperinfection syndrome. Pulmonary symptoms include cough, dyspnea, wheezing, and hemoptysis. An asthma-like syndrome can be seen with chronic *Strongyloides* infection. Respiratory symptoms are thought to be caused by larval migration across alveolar-septal walls, larval maturation in pulmonary parenchyma, or widespread dissemination during the hyperinfection syndrome.[2]

A hyperinfection syndrome occurs when decreased cell-mediated immunity enables accelerated autoinfection, causing widespread parasitemia. Risk factors for hyperinfection include corticosteroids, stem-cell transplantation, alcoholism, HIV, and HTLV-1 infection. Common manifestations include fever, abdominal pain, anemia, and diarrhea.[3,4] Gram-negative bacteremia is a frequent complication, resulting from bacterial translocation in the intestine due to mucosal disruption by *Strongyloides* larvae.

Pulmonary symptoms develop in 85% of hyperinfection patients.[2] Manifestations include pulmonary infiltrates, DAH, and respiratory failure, all of which developed in our patient. Though she also had *E. coli* bacteremia, we believe this was due to urosepsis rather than intestinal translocation.

S. stercoralis hyperinfection carries a high mortality rate of 70–89% in modern series.[1,3,4] All cases complicated by DAH in the medical literature have reported fatal outcomes. Detection of disseminated disease requires high clinical suspicion. Diagnosis is often made by identification of larvae in stool, sputum, or BAL fluid. Ivermectin or albendazole are first-line treatments for uncomplicated infection. In disseminated disease, optimal treatment remains uncertain. Oral ivermectin may be ineffective due to ileus associated with hyperinfection syndrome. Thus, subcutaneous ivermectin has been used in cases of disseminated *Strongyloides*.[5]

It is unclear why our patient developed the hyperinfection syndrome during this admission since she had been on corticosteroids for the preceding 3 months. It is possible that the administration of IV methylprednisolone on admission resulted in further immunosuppression and precipitated her deterioration. Our patient improved dramatically after treatment with oral and subcutaneous ivermectin. She represents the first case of survival in DAH from disseminated *Strongyloides*. In spite of this success, the ideal treatment for disseminated strongyloidiasis remains unknown.

Disclosures

The authors report that no potential conflicts of interest exist with any companies/organizations whose products or services discussed in this article.

Conflict of interest statement

The authors declare no conflicts of interest for this submission.

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