

Strongyloides Hyperinfection: A Rare Cause of Fatal Respiratory Failure

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Introduction

Strongyloides stercoralis is a helminthic parasite that causes chronic infections of the gastrointestinal tract and lungs. The parasite has the unique ability to complete its life cycle in human host and causes hyperinfection or disseminated disease with high mortality if the host's immunity is suppressed, especially with corticosteroids¹. We present a case of fatal pulmonary hyperinfection by strongyloides in a patient with chronic obstructive pulmonary disease (COPD) on chronic prednisone therapy.

Case Presentation:

Patient was a 73 year old Caucasian male with a past history significant for severe COPD requiring chronic corticosteroids and oxygen therapy, who presented with dyspnea and hemoptysis of 2 weeks duration. His symptoms started gradually but progressed to the point that he was not able to perform his activities of daily living secondary to his dyspnea. He was initially treated with azithromycin in the outpatient setting without relief and was then referred to his pulmonologist who admitted him to the hospital for further care. His medical history included COPD, diagnosed 30 years prior, diabetes mellitus type 2, and hypertension. He also had a history of significant alcohol use and heavy cigarette smoking. He was born and raised in Kentucky but has been living in Indiana for many years.

Physical examination revealed an elderly gentleman in apparent distress with tachypnea, tachycardia, bilateral wheezing and basilar

crackles. Laboratory data was significant for anemia, eosinopenia and azotemia. Computed tomography scan of chest showed diffuse bilateral alveolar and interstitial infiltrates (Figure 1). He was placed on broad spectrum antibiotics, but his oxygenation continued to deteriorate. He ultimately required intubation and was placed on mechanical ventilation. Bronchoscopy was performed and demonstrated alveolar hemorrhage. A bronchoalveolar lavage sample collected at the time showed multiple *Strongyloides stercoralis* larvae (Figures 2) and grew *Klebsiella pneumoniae*. Patient was immediately started on Ivermectin along with his current antimicrobial regimen, but his condition progressively deteriorated and the family decided to withdraw care. He died several hours later.

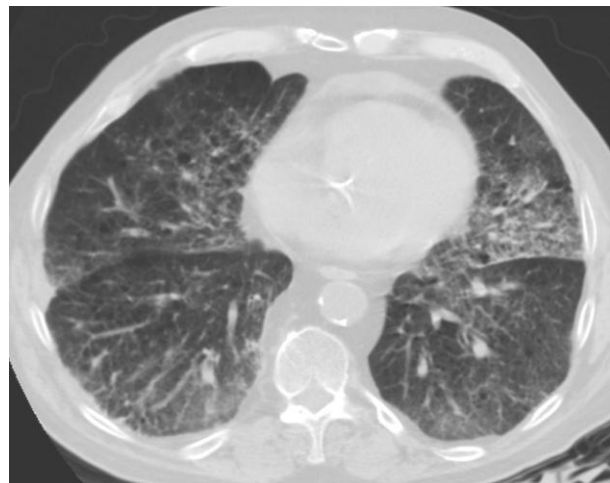


Figure 1- CT scan at presentation

Discussion:

Strongyloidiasis is a parasitic infection that occurs mainly in tropical and subtropical regions. The endemic areas in United States consist of Kentucky, Tennessee, Virginia and North Carolina². The parasite has 3 life forms: adult nematode, rhabditiform larva and filariform larva. The life cycle begins with the passing of rhabditiform larvae in stools (Figure 3). Once they are in soil they can either become the filariform larvae (infective stage) that can penetrate human skin and enter the blood stream or develop into adult forms. After the filariform larvae enter the blood, they are carried to lungs where they can cause cough and wheezing. The symptoms often mimic a flare of asthma. During this phase they are coughed up and swallowed, gaining access to the GI tract. Here, they can penetrate the intestinal wall, enter the bloodstream, and enter the lung. This process is referred to as auto-infection³. The clinical manifestations are varied including skin findings of urticaria and larva currens, gastrointestinal symptoms (nausea, vomiting, intestinal obstruction), and pulmonary manifestations such as wheezing, bronchitis and hemoptysis.

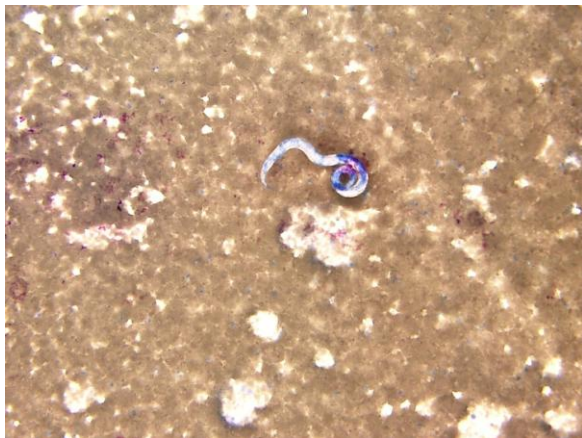


Figure 2- Strongyloides larvae from BAL sample

Strongyloides hyperinfection is characterized by increased numbers of larvae confined to respiratory and gastrointestinal tracts. Disseminated disease denotes presence of larvae in organs not part of usual larval migration route.

The parasite has the unique ability to cause hyperinfection syndrome and disseminated disease years after exposure. Both hyperinfection and disseminated disease are brought on by impaired immunity. Corticosteroids are often the only predisposing factor⁴. It has been shown that corticosteroids increase the apoptosis of T cells, decrease the eosinophil count and inhibit the mast cell response, thus inhibiting the defense mechanisms against the parasite¹. Corticosteroids have also been shown to increase the number of ecdysteroid like substances in intestinal wall, which act as molting signals and lead to increased production of filariform larvae⁵.

Diagnosis of Strongyloides infection is supported by the presence of eosinophilia; this can also be used as marker for successful therapy⁶. The diagnosis is confirmed by documenting the larvae in body fluids. Treatment of hyperinfection and disseminated disease is based on expert opinion and consists of ivermectin alone or in combination with albendazole. Use of stress dose corticosteroids in patients already on steroids is controversial and the decision should be made on case-by-case basis. Mortality is greater than 70% in patients who presents with acute respiratory distress syndrome⁷.

Conclusion:

Strongyloides infection can mimic a variety of disease conditions. A high index of suspicion in patients from endemic areas who are not improving on conventional therapy should alert the clinician to look for this uncommon pathogen and to treat it accordingly.

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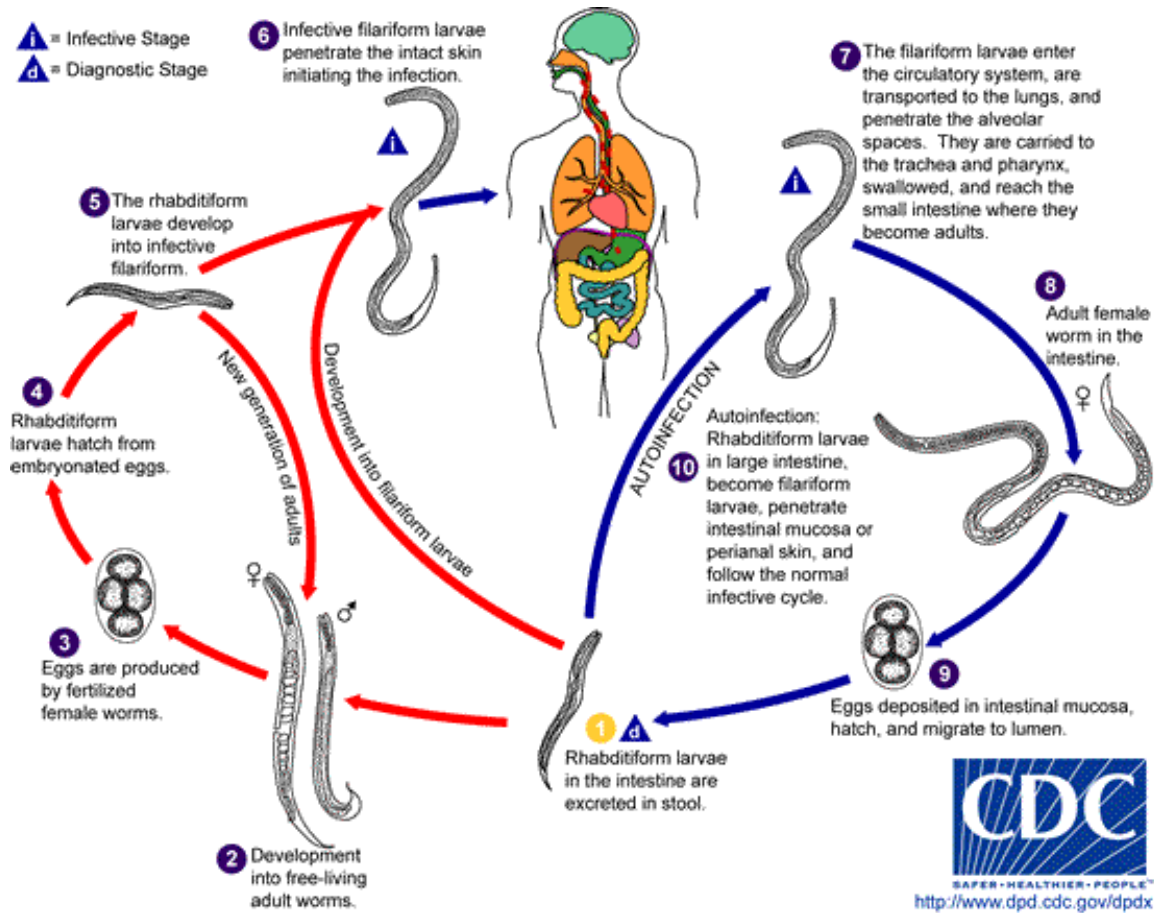


Figure 3- Life cycle of Strongyloides