Letter: Intestinal Strongyloidiasis and Hyperinfection Syndrome Mimicking Bronchial Asthma

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A 73-year-old South Asian male patient with well-controlled asthma and diabetes presented with worsening shortness of breath, cramping abdominal pain, and distension for the past month accompanied by a productive cough and constipation with no bowel movement for the last 4 days. Twenty years earlier, he had emigrated from Bangladesh to his current residence in the Northeast United States.

Initial examination was notable for wheezing and diffuse, mild abdominal tenderness. Workup showed leukocytosis with eosinophilia (absolute eosinophil count of 2.9×10^9/L, eosinophilia 26% w/33% on manual differential). Computed tomography (CT) found minimal atelectasis in the lung bases with scarring in the lingula and scattered sub-centimeter calcified granulomas as well as a short segment of the mural thickening in the sigmoid colon/rectum, concerning for infectious or inflammatory etiology (►**Fig. 1A** and **B**). Initial treatment with nebulizers/steroids and bowel regimens failed to relieve his symptoms.

The following day, the patient developed abdominal and perianal itching. Stool analysis was notable for the presence of *Strongyloides stercoralis* larvae (►**Fig. 1C** and **D**). Steroids were discontinued and a course of oral ivermectin was begun. The pain and itching resolved thenceforth, with a transient worsening of the cough. The patient was discharged on day 6 after having had multiple bowel movements with improvement in his breathing and abdominal pain. Absolute eosinophil count had decreased to 0.7×10^9/L (eosinophilia 4.5%).

Strongyloidiasis is an umbrella term attributed to the various pathologies caused by the nematode helminth *S. stercoralis*, endemic in tropical and subtropical climates, including the southern United States. In chronically infected and immunocompetent individuals, the disease is generally asymptomatic with eosinophilia and stool larvae being the only indication of infection.[1] Acute infection can cause a maculopapular rash, gastrointestinal complaints, cough, and dyspnea. However, a more disseminated form of the disease can lead to a debilitating condition known as *Strongyloides* hyperinfection syndrome (SHS). SHS is caused by a high intestinal parasitic load leading to multi-organ damage through the process of autoinfection, particularly in the pulmonary circulation where parasitic perforation of the alveolar membranes leads to severe respiratory distress.[1,2] This process of autoinfection is unique to *S. stercoralis* when compared to its intestinal nematode companions, allowing the parasite to reside in humans for decades. Systemic neurological, gastrointestinal, pulmonary, and cutaneous symptoms are present in impairing degrees but a hallmark SHS is severe multi-organ failure prompting admission to the ICU. Mortality from SHS is hypothesized to be over 60% with the condition typically occurring in the immunocompromised with underlying conditions such as hematologic neoplasias, advanced HIV/HTLV-1 infection, and organ transplantation.[1,3,4] There are rare reports of SHS occurring in immunocompetent individuals, however, with vast variability on symptomatology, diagnostic modalities, and patient prognoses. Often, diabetes, immunosenescence, and migration from a *S. stercoralis*-endemic region are the only risk factors for infection.[5–7] A 2018 Australian study by Chan et al collated all reports in the literature of immunocompetent patients with SHS, tallying only nine cases in total.[8]

Diagnosing SHS has also proven to be rather challenging due to the unreliability of standard testing. The presence of eosinophilia, often an indicator of parasitic infection, is not actually necessary for diagnosing SHS with reports of only 25

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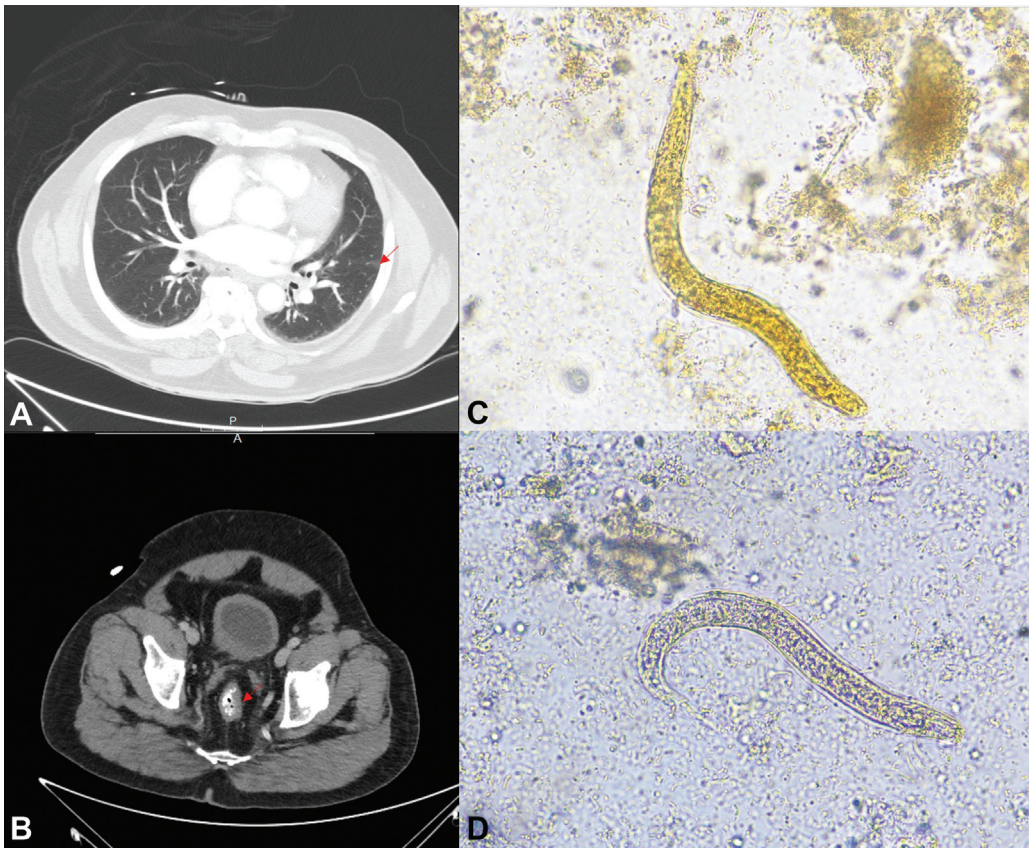

Fig. 1 (**A**) CT Chest with IV contrast showing minimal dependent subsegmental atelectasis in the lung bases, linear scarring in the lingula and scattered subcentimeter calcified granulomas. (**B**) CT Abdomen/Pelvis w IV contrast showing relatively short-segment distal sigmoid/rectal mural thickening, possibly infectious/inflammatory in etiology. (**C**) Iodine contrast staining of stool showing rhabditiform larva of *Strongyloides stercoralis*. (**D**) Fecal agar plate culture showing rhabditiform larva of *Strongyloides stercoralis*.

to 35% of SHS cases in immunocompetent patients showing high eosinophil counts.[4] Stool microscopy confirmed the diagnosis in our above patient but as there is intermittent shedding of parasitic larvae during infection, 70% of cases may be missed on microscopy.[8] Often, patients with SHS present in critical condition and other invasive tests such as duodenal aspirates, bronchoalveolar lavage, or tissue biopsies may need performing. *Strongyloides* serology is more sensitive (83–93%) and specific (95–97.7%) than stool microscopy; however, it runs of the risk of cross-reacting with other helminth infections.[8,9] Despite stool microscopy being diagnostic however, positive serology when stool microscopy is negative is a helpful adjunct in critically sick SHS patients. Ivermectin remains the treatment of choice for *S. stercoralis* but SHS treatment still lacks consensus. Multiple oral and parenteral treatment regimens have been used, including ivermectin, albendazole, and thiabendazole for immunocompetent SHS patients.[8] Treating Gram-negative sepsis and reducing immunosuppression are key management components as well.

Ethical Statement

The case is a retrospective case study; so, documented informed consent was waived. The patient provided verbal consent for his case to be written up.

Author Contributions

All authors contributed equally to the article.

Data Availability Statement

There is no data associated with this work.

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Conflict of interest

None declared.

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