Case Report

Recurrent pneumonia: Can it be parasite induced?

Bhavna P. Singh, Anand B. Mamdapur

Department of Critical Care Medicine, Sakra World Hospital, Bengaluru, Karnataka, India

ABSTRACT

Strongyloides stercoralis is an intestinal nematode acquired primarily in the tropics, estimated to infect approximately 100 million people worldwide. Strongyloidiasis can be asymptomatic in many individuals or present in a variety of ways including acute infection, chronic infection, hyperinfection, and disseminated infection. We present a case where recurrent pneumonia was being evaluated and later found to be due to strongyloides hyperinfection syndrome and successfully treated with ivermectin. A 74-year-old female background of seasonal bronchitis, recurrent lower respiratory tract infections presented to us with Gram-negative bronchopneumonia which was treated but recurred after a few days. Investigations were ongoing for fungal infections when we picked up the *S. stercoralis* hyperinfection. In tropical regions, the regional prevalence of strongyloides infection may exceed 25%. Strongyloides hyperinfection describes the syndrome of accelerated autoinfection, generally the result of an alteration in immune status. Hyperinfection syndrome is estimated to happen in 1–2.5% of the patients with strongyloidiasis. Hyperinfections are often complicated, and gut flora gain access to extraintestinal sites, presumably through ulcers induced by the filariform larvae or by virtue of being carried on the surface or in the intestinal tract of the larvae themselves. Our patient did not have symptoms of strongyloides or reasons for immunosuppression. She only could have been immunosuppressed due to age or possible steroid use for seasonal bronchitis. We want to point out that strongyloides hyperinfection is a possible cause of recurrent Gram-negative pneumonia and sepsis. Parasitic infection screening must be done in all patients in our country who are admitted with severe sepsis.

Key words: Bronchoalveolar lavage, hyperinfection, immunosuppression, *Strongyloides stercoralis*

INTRODUCTION

Our case report hopes to draw attention to parasitic causes for recurrent gram negative pneumonias. We would recommend a parasitic screening and prophylactic anti-helminthics in patients before initiation of immunosuppression including steroids, although further studies are needed especially in tropical countries.

Address for correspondence:
Dr. Bhavna P. Singh, No. 12, Sai Charan, 1st Main, 3rd Cross, Ashwini Layout, Ejjipura Extension, Bengaluru - 560 047, Karnataka, India.
E-mail: bhavna.p.singh@gmail.com

Video Available on: www.caijournal.com

Access this article online	
Quick Response Code:	Website: www.caijournal.com
	DOI: 10.4103/2225-6482.191370

How to cite this article: Singh BP, Mamdapur AB. Recurrent pneumonia: Can it be parasite induced?. Community Acquir Infect 2016;3:87-9.

CASE REPORT

A 74-year-old female presented with a history of fever with chills, progressive breathlessness, and cough with expectoration since 1 week. Further history revealed recurrent lower respiratory tract infections (LRTI's) for which she was admitted in various hospitals about 4–5 times over the last 2 years. She also had a history of seasonal bronchitis over the last 30 years which misled us into thinking it was a chronic obstructive pulmonary disease (COPD) with retained secretions causing recurrent LRTIs. Her chest X-ray showed features of bronchopneumonia for which we started empirical treatment with ceftriaxone, azithromycin, and oseltamivir. Sputum cultures grew Gram-negative bacilli *Klebsiella pneumoniae* and antibiotics were escalated accordingly. She had a dramatic improvement and was shifted out of our Intensive Care Unit (ICU) after 5 days. While in the ward after 2 days, she deteriorated, fever spikes were present, desaturated requiring oxygen and was shifted back to the ICU. This time, we needed to intubate her and mechanically ventilate to achieve oxygenation. Next day, bronchoscopy was planned to rule out any masses, and fungal infections were suspected because of recent antibiotic use. The bronchoalveolar lavage (BAL) sample was sent for cultures, Gram-stain, and KOH mount for fungal infections. The Gram-stain and culture grew Gram-negative *Klebsiella*, which was multidrug resistant. However, since the BAL fluid was watery, a wet mount was done before adding KOH. To our surprise, alive filariform larvae were motile and plenty in number [Figure 1]. Further analysis revealed it was *Strongyloides stercoralis* [Video 1]. A strongyloides hyperinfection diagnosis was made and ivermectin 200 μg/kg started for 2 weeks according to the center of disease control (CDC) recommendations. Patient responded well and was discharged home on day 10 of ivermectin and course completed at home.

Figure 1: Picture of the rhabditiform larva of *Strongyloides stercoralis* from bronchoalveolar specimen of patient

DISCUSSION

S. stercoralis is an intestinal nematode acquired primarily in the tropics or subtropics, estimated to infect approximately 100 million people worldwide.[1] Strongyloidiasis can be asymptomatic in many individuals but can present in a variety of ways including acute infection, chronic infection, hyperinfection, and disseminated infection. In tropical and subtropical regions, the overall regional prevalence may exceed 25%.[2]

Life cycle

Infection is initiated by infectious larvae penetrating the skin, often on the soles of the feet.[3] After dermal penetration, the filariform larvae, through undefined mechanisms, migrate to the small intestine. The most clinically relevant, migration is the classic pulmonary route, in which organisms enter the bloodstream and are carried to the lungs, ascending the tracheobronchial tree to enter the gastrointestinal tract.[4] Some rhabditiform larvae transform into invasive filariform larvae before being excreted. As such, they are capable of reinfecting the host by invading the intestinal wall or the perianal skin.[5] This autoinfective cycle can occur at a low level throughout infection and allows subsequent generations to persist in the host indefinitely.[6] Here, we will discuss hyperinfection syndrome as our patient was diagnosed of it. Acute chronic and disseminated infections can present with strongyloides but the diagnosis is not so elusive in them.[7]

Hyperinfection syndrome

Hyperinfection describes the syndrome of accelerated autoinfection, generally the result of an alteration in immune status.[7] Immunosuppression, either iatrogenic (for example, use of systemic corticosteroids for COPD or asthma, systemic lupus erythematosus, rheumatoid arthritis, autoimmune hemolytic anemia, and chronic active hepatitis) or due to intercurrent illness such as human T-cell lymphotropic virus-1 and human immunodeficiency virus (HIV) infection, organ transplantation, and other infectious diseases such as kala-azar can increase the risk of hyperinfection syndrome in patients with strongyloidiasis.[8-10]

- Hyperinfection syndrome is estimated to happen in 1.5–2.5% of the patient's with strongyloidiasis.[5] Hyperinfections are often complicated and can be preceded by infections caused by gut flora that gain access to extraintestinal sites, presumably through ulcers induced by the filariform larvae or by virtue of being carried on the surface or in the intestinal tract of the larvae themselves. Blood cultures from patients with hyperinfection have grown *Escherichia coli*, *K. pneumoniae*, *Proteus mirabilis*, *Pseudomonas*, *Enterococcus faecalis*, coagulase-negative staphylococci, *Streptococcus bovis*, and *Streptococcus pneumoniae*. Polymicrobial infections can also occur[5,11]
- The intestinal manifestations include severe cramping abdominal pain, watery diarrhea, weight loss, nausea, vomiting, and occasionally gastrointestinal bleeding[12]
- The extraintestinal manifestations include mainly

asthma-like symptoms such as cough and wheezing, and others such as pneumonia and pulmonary hemorrhage with diffuse bilateral infiltrates on the chest X-ray.[8,12] Rare conditions such as eosinophilic pleural effusions and eosinophilic granulomatous enterocolitis have also been reported in strongyloidiasis.[13] CDC recommendations for the treatment of hyperinfection syndrome are ivermectin 200 μg/kg/day orally until stool and/or sputum examinations are negative for 2 weeks

- Points of discussion here are ourpatient did not have eosinophilia, her IgE levels were normal, and her HIV status was nonreactive. She also did not have any gastrointestinal symptoms adding the confusing picture. Her stool sample also did not have any larvae or eggs. She only could have been immunosuppressed due to age or possible steroid use for seasonal bronchitis. We want to point out that strongyloides hyperinfection is a possible cause of Gram-negative and rarely Gram-positive pneumonias and Gram-negative sepsis. Parasitic infection screening must be done in all patients in our country who are admitted with severe sepsis.

Acknowledgment

I would like to extend my sincere thanks to the Department of Microbiology at Sakra World Hospital particularly Dr. Gokul and Dr. Julie.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Olsen A, van Lieshout L, Marti H, Polderman T, Polman K, Steinmann P, *et al.* Strongyloidiasis – The most neglected of the neglected tropical diseases? Trans R Soc Trop Med Hyg 2009;103:967-72.
2. Schär F, Trostdorf U, Giardina F, Khieu V, Muth S, Marti H, *et al. Strongyloides stercoralis*: Global distribution and risk factors. PLoS Negl Trop Dis 2013;7:e2288.
3. Knopp S, Mohammed KA, Simba Khamis I, Mgeni AF, Stothard JR, Rollinson D, *et al.* Spatial distribution of soil-transmitted helminths, including *Strongyloides stercoralis*, among children in Zanzibar. Geospat Health 2008;3:47-56.
4. Mansfield LS, Alavi A, Wortman JA, Schad GA. Gamma camera scintigraphy for direct visualization of larval migration in *Strongyloides stercoralis*-infected dogs. Am J Trop Med Hyg 1995;52:236-40.
5. Vadlamudi RS, Chi DS, Krishnaswamy G. Intestinal strongyloidiasis and hyperinfection syndrome. Clin Mol Allergy 2006;4:8.
6. Neva FA, editor. Intestinal nematodes of human beings. In: Basic Clinical Parasitology. Norwalk, CT: Appleton & Lange; 1994. p. 123-8.
7. Mejia R, Nutman TB. Screening, prevention, and treatment for hyperinfection syndrome and disseminated infections caused by *Strongyloides stercoralis*. Curr Opin Infect Dis 2012;25:458-63.
8. Concha R, Harrington W Jr., Rogers AI. Intestinal strongyloidiasis: Recognition, management, and determinants of outcome. J Clin Gastroenterol 2005;39:203-11.
9. Siddiqui AA, Berk SL. Diagnosis of *Strongyloides stercoralis* infection. Clin Infect Dis 2001;33:1040-7.
10. Singh S. Human strongyloidiasis in AIDS era: Its zoonotic importance. J Assoc Physicians India 2002;50:415-22.
11. Feitosa G, Bandeira AC, Sampaio DP, Badaró R, Brites C. High prevalence of giardiasis and stronglyloidiasis among HIV-infected patients in Bahia, Brazil. Braz J Infect Dis 2001;5:339-44.
12. Keiser PB, Nutman TB. *Strongyloides stercoralis* in the immunocompromised population. Clin Microbiol Rev 2004;17:208-17.
13. Reechaipichitkul W, Chuesakoolvanich K. Eosinophilic pleural effusion in adults at Srinagarind Hospital. Southeast Asian J Trop Med Public Health 2003;34:374-8.