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Clinical Observations

Cerebral Paragonimiasis: An Unusual Manifestation of a Rare Parasitic Infection

Supriya Kohli MD, Osman Farooq MD *, Ronak B. Jani MD, Gil I. Wolfe MD

Department of Neurology, University at Buffalo School of Medicine and Biomedical Sciences, The State University of New York, Buffalo, New York

ABSTRACT

BACKGROUND: Paragonimiasis is a parasitic disease that typically produces a subacute to chronic inflammatory disease of the lung. Although rare in the United States, paragonimiasis is sporadically observed in the immigrant population. Rarely, paragonimiasis can affect the nervous system. This infection is even more unusual in the pediatric population, and therefore can be challenging to diagnose. **PATIENTS:** Here we present a child with cerebral paragonimiasis. She presented with new onset seizures in the setting of a febrile illness. Magnetic resonance imaging of the brain with contrast revealed a ring-enhancing lesion within the right frontal lobe and a second lesion in the left parietal lobe extending from the cortex to the centrum semiovale. Extensive evaluation including stool ova and parasite analysis confirmed the diagnosis of *Paragonimus westermani*. She was treated with praziquantel and prednisone and improved both clinically and radiographically. **CONCLUSIONS:** Cerebral paragonimiasis is diagnosable and treatable and therefore is important to consider in the differential of immigrants presenting with cavitary lung lesions and central nervous system findings.

Keywords: pediatric, cerebral, paragonimus, parasite

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Introduction

Paragonimiasis, also known as lung fluke disease, is a parasitic disease in humans and other mammals caused by infection with the *Paragonimus species*. Worldwide it is the most common cause of hemoptysis.[1] Human infection typically occurs after ingestion of infectious *Paragonimus metacercariae* in freshwater crab or crayfish. Therefore, the disease is usually limited to areas where inhabitants consume raw or undercooked shellfish including Southeast Asia, Africa, and Central America. Paragonimiasis is reported to be more prevalent in middle-aged individuals, and they frequently present with nodular lesions on chest radiography. However, paragonimiasis is occasionally reported in children and is often misdiagnosed as pulmonary tuberculosis, pneumonia, rheumatopyra, liver abscess, or meningitis.[1,2] Here, we present an unusual a child with cerebral paragonimiasis.

Patient Description

A 10-year-old girl of Burmese descent immigrated to Western New York after living in Malaysia for several years. While residing overseas, she had been treated for pulmonary tuberculosis, tuberculous meningitis, and seizures. Three weeks after arriving in the United States, she presented to a general pediatrician with a 3-day history of fever, abdominal pain, vomiting, diarrhea, and headache. She was started on amoxicillin; however, over the next 2 days, her symptoms progressed to include worsening headache with neck and back pain. The next day she had an episode of transient right arm and leg weakness that self-resolved after 1 minute. There was no reported alteration of consciousness or focal or generalized tonic-clonic activity.

She had been diagnosed 5 years earlier with pulmonary tuberculosis, with two recurrences within the last 6 months. She was treated with standard antimycobacterial regimens each time. During the last recurrence, she was also diagnosed with meningitis after experiencing a convulsive seizure. She was subsequently placed on an unknown

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* Communications should be addressed to: Dr. Farooq; Department of Neurology; University at Buffalo; Women & Children's Hospital of Buffalo; 219 Bryant Street; Buffalo, New York 14222.

E-mail address: ofarooq3@buffalo.edu

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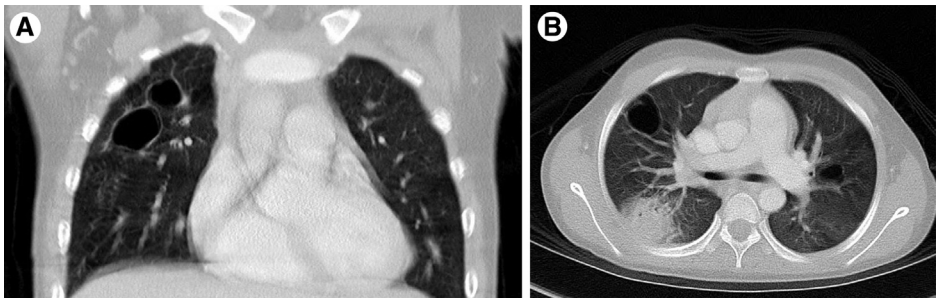

FIGURE 1.
(A) Coronal computed tomography (CT) chest revealed two thin-walled cavitary lesions in the right upper lobe. (B) Axial CT chest revealed bilateral cavitary lesions.

antiepileptic agent for a month. She was not on any medications at the time she immigrated to Western New York.

Her physical examination was significant for mildly reduced strength in proximal and distal muscles of the right upper extremity. The remainder of the general and neurological exam was within normal limits. Computed tomography (CT) of the chest revealed multiple cavitary lesions with mediastinal and hilar lymphadenopathy (Fig 1). Magnetic resonance imaging (MRI) of the brain with contrast revealed a ring-enhancing lesion within the medial/inferior right frontal lobe, with restricted diffusion and surrounding vasogenic edema (Fig 2). A second lesion was observed in the left parietal lobe, extending from the cortex to the centrum semiovale with mild enhancement in the periphery. Electroencephalography revealed intermittent generalized slowing with superimposed intermittent slowing in the left temporal region.

Cerebrospinal fluid analysis revealed a white cell count of 3550/mm^3 (normal <7/mm^3) with neutrophilic predominance, elevated protein of 127 mg/dL (normal 15-45 mg/dL) and normal glucose. Complete blood count showed an elevated white cell count of 15.4 $\times$ 10^9 with 55% neutrophils and 10% eosinophils (normal <6%).

Given the patient's recent immigration from a developing nation and reported history of mycobacterial infection, empiric treatment with isoniazid, rifampicin, pyrazinamide, and ethambutol with pyridoxine supplementation was started for the initial working diagnosis of tuberculous meningitis. After three consecutive sputum acid-fast bacilli stains and a culture returned negative, a lung biopsy was performed which revealed Charcot-Leyden crystals with prominent tissue eosinophilia consistent with a parasitic or fungal infection. Stool ova and parasite analysis confirmed the diagnosis of *Paragonimus westermani*. She was treated with praziquantel with prednisone added to reduce the possibility of an immune reaction. Head MRI 1 month later showed reduction in the size of lesions with decrease in contrast enhancement (Fig 3). At the time of discharge, she was asymptomatic, and her only medication was levetiracetam for seizure prophylaxis.

Medical records from Malaysia subsequently confirmed the presence on multiple chest CT scans over the preceding years of cavitary lesions that had been attributed to tuberculosis, at times with air-fluid levels.

Discussion

Trematodes of the *Paragonimus* genus cause paragonimiasis, a parasitic disease that typically produces subacute to chronic inflammatory disease of the lung. *Paragonimus* species are hermaphroditic, containing both ovaries and testes, a differentiating point from other trematodes. The family consists of various species, with *Paragonimus westermani* being the most widely distributed.[1,3]

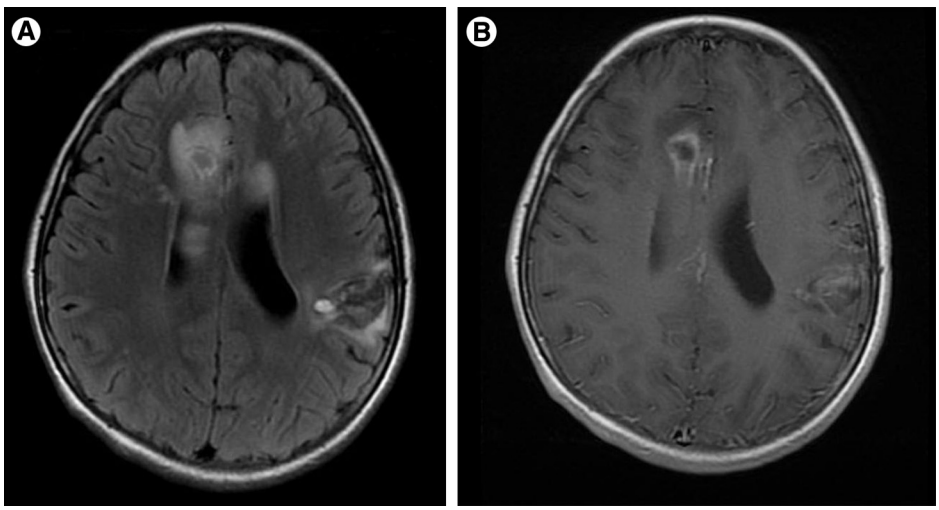

FIGURE 2.
(A) Pretreatment axial fluid attenuated inversion recover (FLAIR) image and (B) Pretreatment postcontrast T_1 image revealing a ring-enhancing lesion in the medial/inferior aspect of the right frontal lobe with surrounding edema and minimal mass effect upon the medial frontal lobe. A second lesion is revealed with enhancement within the left parietal lobe with slightly decreased enhancement centrally and surrounding edema and minimal mass effect on the adjacent parietal lobe. Increased signal is revealed at the left medial/inferior frontal lobe suspicious for edema surrounding a potential third lesion. Meningeal enhancement is observed around both lesions.