



## Case report

## Paragonimiasis presenting as an acute hemorrhagic stroke

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## ABSTRACT

Cerebral paragonimiasis is rare and is usually seen in younger patients. This is a case of a 19-year-old male presenting as a hemorrhagic stroke with headache and blurred vision. He was found to have cystic thick-walled spaces with focal linear tracking towards the pleural space on computed tomography of the chest. CSF analysis showed pleocytosis with 4% eosinophils. Serological testing confirmed the diagnosis of paragonimiasis. He was treated with praziquantel, corticosteroid taper and anti-epileptic medication and discharged home in stable condition. CNS paragonimiasis is treatable, has a fairly good prognosis but can often be missed. In a young person presenting with an acute hemorrhagic stroke, the possibility of paragonimiasis should be kept on the differential diagnosis.

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## Introduction

Paragonimiasis is food borne illness cause by a trematode of the genus *Paragonimus*. There are over 10 species known to infect humans; *Paragonimus westermani* (most common) seen in southeast Asia, *Paragonimus mexicanus* in Central and South America and *Paragonimus kellicotti*, endemic to North America [1]. While most infections are asymptomatic, it can manifest as pulmonary or extrapulmonary – cerebral, abdominal or subcutaneous infection. Cerebral paragonimiasis is rare and is usually seen in younger patients [2–4].

## Case presentation

A 19-year-old male, with no significant past medical history presented to the emergency room with severe headache, blurred vision and confusion. Headaches began 2 months prior, with acute worsening with changes in vision for the last 3 days. He did not report fevers, cough, shortness of breath or chest pain. Originally from Honduras, the patient moved to the United States 6 months prior to presentation. He denied illicit drug use, recent trauma or injury. He denied consumption of raw seafood or shellfish. He did not report any contact with animals.

His vital signs on admission were within normal limits. Physical examination was remarkable for decreased visual acuity in both eyes

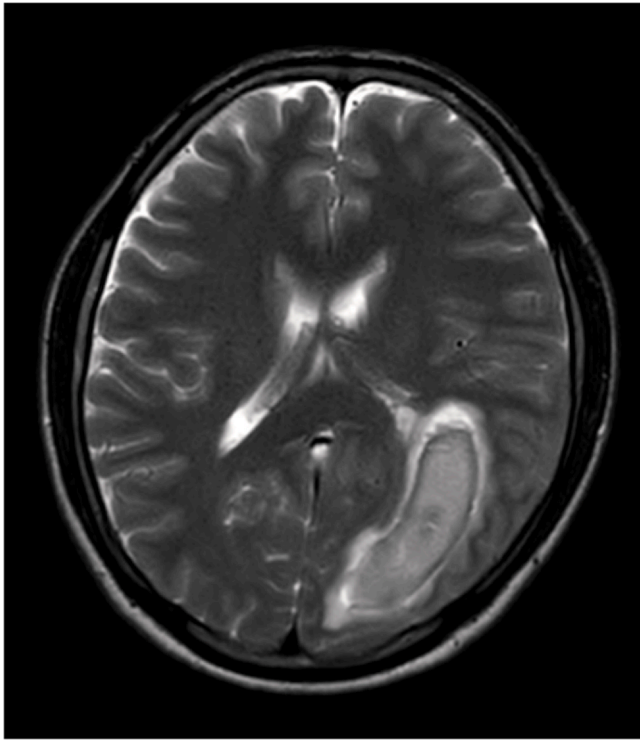
with complete loss of peripheral vision in right eye. Extraocular movements remained intact. No other focal neurological deficits were noted. Initial laboratory findings revealed a normal total white blood cell count with peripheral eosinophilia of 1230/ $\mu$ L. Serum interferon-gamma release assay for mycobacterium tuberculosis was positive, HIV test was negative. He received the Bacille Calmette-Guerin (BCG) vaccine as a child.

A non-contrast computed tomography (CT) of the head revealed an acute parenchymal hemorrhage in the left parieto-occipital region. These findings were confirmed with Magnetic Resonance Imaging (MRI) of the brain (Fig. 1). A diagnostic cerebral angiogram did not reveal aneurysm, arteriovenous malformation, or fistula. Echocardiography did not show any evidence of endocarditis. CT angiography of the head and neck was unremarkable except for bronchiectasis in the right upper lobe of the lung. These findings prompted a CT of the chest that showed bilateral ground-glass infiltrate with cystic thin-walled linear tracks in the right upper lobe, some of which communicated with the pleural space (Fig. 2).

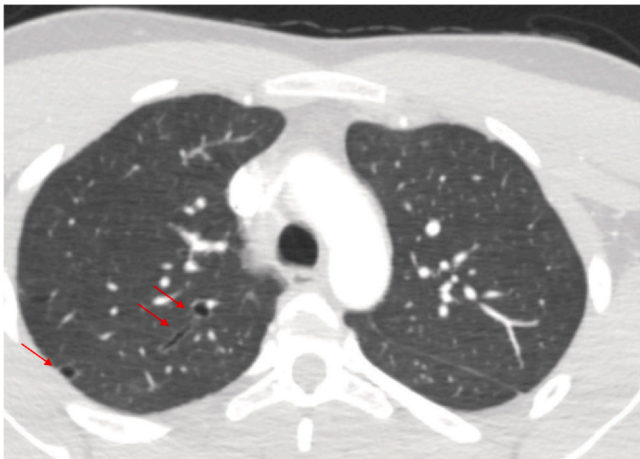
Subsequently he underwent a diagnostic bronchoscopy followed by a lumbar puncture. Bronchoscopic alveolar lavage (BAL) remained negative for routine bacterial, fungal, acid-fast organisms, as well as ova and parasites. Cerebrospinal fluid (CSF) analysis revealed pleocytosis with white cell count of 315/ $\mu$ L, and 4% eosinophils. CSF protein and glucose were within normal limits. CSF cultures, meningitis/encephalitis polymerase chain reaction (PCR) panel as well as stain for ova and parasites was negative. Serum cysticercosis antibody as well as strongyloidiasis antibody remained negative. The serum paragonimiasis antibody by immunoblot performed at the Centers for Disease Control (CDC) laboratory came back positive. He

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**Fig. 1 :** Axial T2 weighted sequence from brain MRI: Acute intraparenchymal hemorrhage in the left parieto-occipital region with surrounding vasogenic edema.



**Fig. 2.** Axial CT chest: Linear tracts and subpleural cystic lucencies present in the right upper lobe (red arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

was treated with praziquantel, along with a tapering dose of corticosteroids and anti-epileptic medication, which he tolerated well. He was discharged home in stable condition.

At his 1 month follow up visit, he reported complete resolution of headache, a significant improvement in vision loss with some residual deficit on right lateral peripheral vision.

**Discussion**

We report a case of paragonimiasis presenting as a hemorrhagic stroke. Human infection occurs by ingestion of raw or undercooked

shellfish infected with *Paragonimus*. Hosts infected with *Paragonimus* species release eggs through sputum or stool. Miracidia hatch from these eggs and infect snails. Cercariae from the snails then infect the second intermediate host; usually shell-fish. Once ingested, the metacercaria travel through the intestinal wall into the peritoneal cavity, penetrate the diaphragm and the pleura and enter the lungs where they develop into adult worms and begin producing eggs. Common pulmonary findings on chest CT include low attenuation cystic lesions filled with fluid or gas, airspace consolidation, lung nodules and linear opacities extending from the pleural space to the lungs [7]. Worms may also reach other organs like brain and skeletal muscles [1].

Cerebral paragonimiasis can present as meningitis, encephalitis, intra-cranial hemorrhage or a space occupying lesion. Early infection presents as eosinophilic meningitis with fevers, headaches and seizures. Cerebral hemorrhage is thought to occur due to migration of eggs, eosinophilic infiltrations and granuloma formation leading to capillary rupture. CSF examination commonly shows eosinophilia however visualization of eggs or adult flukes is rare [2]. Serological tests like enzyme-linked immunosorbent assay (ELISA) or Immunoblot are both highly sensitive and specific for paragonimiasis [5]. While serology is useful in diagnosis, it has limited value in monitoring post therapy as these antibodies can persist for up to two years post treatment [6]. Treatment consists of oral praziquantel 25 mg/kg three times per day for 2 days along with a short course of corticosteroids. Triclabendazole is an acceptable alternative to praziquantel [1].

Our patient had asymptomatic pulmonary infection with symptomatic meningitis for at least 2 months prior to presentation. Acute worsening of headaches, new onset of vision loss and confusion was likely due to development of intracranial hemorrhage. Had it not been for the atypical changes seen on the CT chest, paragonimiasis would not have come up on the differential diagnosis. CNS paragonimiasis is treatable and has a fairly good prognosis [4]. Due to the rarity of this disease, it can often be missed. In a young person presenting with an acute hemorrhagic stroke, the possibility of paragonimiasis should be kept on the differential diagnosis.

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**References**

- [1] Center for Disease Control and Prevention: Paragonimiasis [Online] Last accessed 6 September 2021. Available: <https://www.cdc.gov/parasites/paragonimus/index.html>.
- [2] Xia Y, Ju Y, Chen J, You C. Hemorrhagic stroke and cerebral paragonimiasis. *Stroke* 2014;45(11):3420–2. <https://doi.org/10.1161/STROKEAHA.114.007267>. Epub 2014 Sep 30. PMID: 25270625.
- [3] Xia Y, Ju Y, Chen J, You C. Cerebral paragonimiasis: a retrospective analysis of 27 cases. *J Neurosurg Pedia* 2015;15(1):101–6. <https://doi.org/10.3171/2014.10.PEDS14208>. PMID: 25380173.
- [4] Chen J, Chen Z, Lin J, Zhu G, Meng H, Cui G, et al. Cerebral paragonimiasis: a retrospective analysis of 89 cases. *Clin Neurol Neurosurg* 2013;115(5):546–51. <https://doi.org/10.1016/j.clineuro.2012.06.025>. Epub 2012 Jul 13. PMID: 22795301.
- [5] Fischer PU, Curtis KC, Folk SM, Wilkins PP, Marcos LA, Weil GJ. Serological diagnosis of North American Paragonimiasis by Western blot using *Paragonimus kellicotti* adult worm antigen. *Am J Trop Med Hyg* 2013;88(6):1035–40. <https://doi.org/10.4269/ajtmh.12-0720>
- [6] Cho SY, Kong Y, Yun DH, Kang SY, Kim LS, Chung YB, et al. Persisting antibody reaction in paragonimiasis after praziquantel treatment is elicited mainly by egg antigens. *Korean J Parasitol* 2000;38(2):75–84. <https://doi.org/10.3347/kjp.2000.38.2.75>
- [7] Im J G. Pleuropulmonary paragonimiasis: radiologic findings in 71 patients. *Am. J. Roentgenol.* 1992. <https://doi.org/10.2214/ajr.159.1.1609718>