Eosinophilic meningitis caused by *Angiostrongylus cantonensis* in an infant
A case report

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**Abstract**

**Rationale:** Parasitic eosinophilic meningitis is rarely observed in infants. The diagnosis of this disease is complicated by its atypical and severe clinical manifestations.

**Patient concerns:** An infant presented to our hospital with high fever and irritability, as well as refusal to walk. Cerebrospinal fluid collected through lumbar puncture showed increased eosinophil count and third-stage *Angiostrongylus cantonensis* larvae.

**Diagnoses:** Eosinophilic meningitis was suspected.

**Interventions:** We started empiric treatment with levamisole (14 mg bid, 2.5 mg/kg-day) and prednisone (17.5 mg qd, 1.5 mg/kg-day).

**Outcomes:** All of the infant’s symptoms were resolved approximately 72 hours after treatment. The patient fully recovered from her illness after completing 4 weeks of levamisole and prednisolone treatment.

**Lessons:** *A. cantonensis* is the most common cause of parasitic eosinophilic meningitis cases in Southeast Asia. Physicians treating infants who live in areas where *A. cantonensis* is endemic and who present with irritability, abnormal motor function, and elevated eosinophil count should be aware of the disease to provide timely and rational therapy to the patients.

**Abbreviations:** CSF = cerebrospinal fluid, PUMCH = Peking Union Medical College Hospital.

**Keywords:** CSF = cerebrospinal fluid, PUMCH = Peking Union Medical College Hospital.

**1. Introduction**

*Angiostrongylus cantonensis* is the most common cause of eosinophilic meningitis among humans living in Southeast Asia and throughout the Pacific Basin. Individuals become infected with this parasite by consuming contaminated raw snails, vegetables, small mollusks, or fresh water. The third-stage larvae of *A. cantonensis* induce eosinophilic meningitis once entrenched in the central nervous system. Eosinophilic meningitis induced by *A. cantonensis* infection is rarely observed in infants. Furthermore, the diagnosis of this disease is complicated by its atypical and relatively severe clinical manifestations. We present a case of a 15-month-old Chinese girl with eosinophilic meningoencephalitis caused by *A. cantonensis*. Moreover, we review the methods used to diagnose and examine this disease in infants.

**2. Ethical statement**

Given that this study mainly involves retrospective patient observations, ethical approval was unnecessary. Informed consent was obtained from the patient’s father for publication.

**3. Case report**

A 15-month-old girl was admitted to the Peking Union Medical College Hospital (PUMCH). The girl had experienced high fever for 3 weeks, irritability for 2 weeks, and refusal to walk for 1 week. Three weeks before admission to PUMCH, she was seen at a local clinic (Haikou City, Hainan Island, located in the southern end of China) for fever and constipation. Physical examination was normal, and she was treated with ibuprofen. One week later, she presented to Haikou People’s Hospital with a persistent high fever of over 39.5°C, irritability, and crying during the night. The result of head computer tomography scan was normal, and lumbar puncture revealed an opening pressure of 140 mm H2O. Her cerebrospinal fluid (CSF) was clear and had 120 white blood cells with 38% neutrophils and 62% lymphocytes. The patient was treated for viral meningitis with an antiviral for 2 weeks. Thereafter, she refused to walk because of lower limb pain. The patient’s fever was not relieved by treatment.

This girl was gravida 1 para 1 and was the full-term baby of an uncomplicated pregnancy. She had been raised in the countryside of Hainan Island. She had normal developmental milestones, uneventful previous history, and full immunization for her age. The patient cried and was extremely irritable during the physical examination. The physical examination showed that she had a weight of 11.5 kg and a temperature of 40°C. Rashes, lymphadenectasis, and joint redness were not observed. Skin sensation could not be evaluated because the patient responded to...
performed 4 weeks after the first lumbar puncture revealed that the eosinophil levels in the child’s CSF had decreased to 0. The patient was discharged from the hospital and completed 4 weeks of treatment with levamisole and prednisolone. At the 6-month follow-up, the patient showed normal growth and development without sequelae.

4. Discussion

Eosinophilic meningitis in infants is rare, and its diagnosis is complicated by its atypical clinical manifestation. To the best of our knowledge, this is the first report of *A. cantonensis* infection in a Chinese infant. Here, we summarize the epidemiology, clinical presentations, laboratory data, treatment, and clinical outcome of *A. cantonensis* infection in an infant.

*A. cantonensis* is the most common cause of parasitic eosinophilic meningitis in humans living in Southeast Asia and throughout the Pacific Basin. Previous cases of parasitic eosinophilic meningitis in infants were distributed around Pacific, American Samoan,[1-2] Hawaii,[3] Jamaica,[4] and Australia.[5] Humans become infected with *A. cantonensis* by consuming raw snails, vegetables, small mollusks, or fresh water contaminated with the third-stage larvae of this parasite. A history of consuming the intermediate or paratenic hosts of *A. cantonensis* is critical for diagnosis. This history, however, is difficult to confirm in infants because of their inability to speak. Infants who indiscriminately place objects in their mouths may ingest infective larvae from various sources. Our patient resided in Hainan Island, which is located in the southern end of China where *A. cantonensis* is widely distributed.[6] Our patient’s mother recalled that the child had picked up and swallowed a slug. However, in most cases, the source of the infection is not established.[3-5]

The main symptoms of eosinophilic meningitis in adults include headache, neck stiffness, paresthesias, vomiting, and nausea.[7] However, the symptoms of infants with eosinophilic meningitis differ greatly from those of adults. Compared with adults, infants are less likely to present headache, neck stiffness, and paresthesias but are more likely to present fever, irritability, and motor-function abnormalities.[1-5] The incidence rates of anorexia and constipation are relatively higher among infants than among adults. Our patient presented fever and refusal to walk. Similar features were observed in 2 other infants.[2-4]

The detection of circulating antigens in serum or CSF enables the rapid confirmation of infection. However, the diagnosis of *A. cantonensis* in clinically suspected patients should not be excluded on the basis of negative CSF test results.[8] Recent research found that CSF eosinophil counts of 40% or higher are significantly predictive for positive serologic tests.[9] Although the CSF eosinophil levels of most previous infant cases were higher than 40%,[1-3] the diagnosis of *A. cantonensis* should not be excluded on the basis of absent CSF eosinophilia.[7]

The parasites that were observed in the CSF of our patient were identified as the third-stage larvae of *A. cantonensis*. Similarly, parasites have been found in the CSF of a 17-month-old boy.[4] Parasites were also observed in the brains and lungs of 2 fatal cases.[4,5]

Corticosteroid therapy has been effective in the treatment of human angiostrongyliasis, and anthelmintics have been used to relieve and shorten the duration of symptoms of this disease. The combination of corticosteroids and anthelmintics has been commonly used to treat human angiostrongyliasis.[10] We treated our patient with prednisone and levamisole. Supportive and symptomatic treatments are also important for infants.[2,3]
Most cases with *A cantonensis* are self-limited, and fatal encephalitic angiostrongyliasis among adults is rare. However, infants are more likely to die than adults from encephalitic angiostrongyliasis induced by *A cantonensis* because they cannot be diagnosed rapidly. Two out of 5 previously reported cases of encephalitic angiostrongyliasis were fatal and involved the lungs of the infants.\(^4,5\) Our patient and 2 other previous patients presented good recovery,\(^1,3\) and 1 infant had hydrocephalus.\(^2\)

Eosinophilic meningitis in infants is rare. Its diagnosis is complicated by its atypical clinical manifestation and the difficulty in confirming the patient’s history of consuming intermediate or paratenic hosts of *A cantonensis*. Physicians treating infants who live in areas where *A cantonensis* is endemic and who present with irritability, abnormal motor function, and elevated eosinophil count should be aware of the disease to provide timely and rational therapy to the patients.

**Author contributions**

Writing – original draft: Mingsheng Ma.
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**References**

[1] Maurer DM, Greene JP, Vincent JM, et al. Fever, refusal to walk and eosinophilia in a ten-month-old Samoan boy. *Pediatr Infect Dis J* 2001;20:230–3.
[2] Enzenauer RW, Yamazaki RM. Eosinophilic meningitis and hydrocephalus in an infant. *Arch Neurol* 1982;39:380–1.
[3] Kuberski T, Bart RD, Briley JM, et al. Recovery of *Angiostrongylus cantonensis* from cerebrospinal fluid of a child with eosinophilic meningitis. *J Clin Microbiol* 1979;9:629–31.
[4] Lindo JP, Escoffery CT, Reid B, et al. Fatal autochthonous eosinophilic meningitis in a Jamaican child caused by *Angiostrongylus cantonensis*. *Am J Trop Med Hyg* 2004;70:425–8.
[5] Cooke-Yarborough CM, Kornberg AJ, Hogg GG, et al. A fatal case of angiostrongyliasis in an 11-month-old infant. *Med J Aust* 1999;170:541–3.
[6] Hu X, Du J, Tong C, et al. Epidemic status of *Angiostrongylus cantonensis* in Hainan island, China. *Asian Pac J Trop Med* 2011;4:275–7.
[7] Wang QP, Lai DH, Zhu XQ, et al. Human angiostrongyliasis. *Lancet Infect Dis* 2008;8:621–30.
[8] Sawanyawisuth K, Sawanyawisuth K, Intapan PM, et al. Specificity of immunoblotting analyses in eosinophilic meningitis. *Mem Inst Oswaldo Cruz* 2011;106:370–2.
[9] Sawanyawisuth K, Sawanyawisuth K, Senthong V, et al. How can clinicians ensure the diagnosis of meningitic angiostrongyliasis? *Vector Borne Zoonotic Dis* 2012;12:73–5.
[10] Sawanyawisuth K, Sawanyawisuth K. Treatment of angiostrongyliasis. *Trans R Soc Trop Med Hyg* 2008;102:990–6.