

## Case Report

# Is this eosinophilic meningitis in a Nigerian child?

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## Abstract

Meningitis is a dreaded disease entity with a clinical course and prognosis that is dependent on its etiology, which is an important source of concern in ensuring proper management. The frequently implicated etiologic agents are bacterial and less often viral; however, rare causes requiring a different management approach may also masquerade as these common causes as is seen in eosinophilic meningitis (EoM). Against this background, the case of a Nigerian male child with suspected helminth-induced EoM, management approach, and outcome is described.

**Key words:** Eosinophils, helminthiasis, meningitis

## Introduction

Eosinophilic meningitis (EoM) is defined as the presence of ten or more eosinophils/mm<sup>3</sup> of cerebrospinal fluid (CSF) or at least 10% eosinophils in the total CSF leukocyte count.<sup>[1-3]</sup> It is a rare form of meningitis accounting for about 2% of all meningitis cases.<sup>[4]</sup> The causes include infections such as helminthic or fungal infections and non-infectious causes such as drugs, allergy to shunts, and myeloproliferative diseases.<sup>[4]</sup> However, helminthic infections are the leading cause of the central nervous system (CNS) eosinophilia, with *Angiostrongylus cantonensis* ranked as the most common.<sup>[1,4,5]</sup>

*A. cantonensis* is a neurotropic helminth found in rat lungs from where its larvae migrate to the gut and subsequently passed to humans through the consumption or handling of raw or undercooked infected seafoods including molluscs,

crabs, and prawns, which act as intermediate host.<sup>[2,4,6]</sup> Therefore, people at risk are those in close and frequent contact with these infected intermediate hosts and their products as is found in areas such as Southeast Asia, the South Pacific, Japan, Taiwan, Cuba, and some parts of Africa including Egypt and Cote d'Ivoire, where EoM is endemic with reports of hundreds to thousands of yearly cases in some areas.<sup>[2,4,5,7]</sup> On the other hand, sporadic cases of the disease have been recorded in different parts of the world due to increased globalization, migration, and international commerce.<sup>[4,8]</sup> In Nigeria, only one case has been previously reported to the best of our knowledge even though the isolation of *A. cantonensis* in rodents had been earlier reported in Nigeria.<sup>[6,8]</sup> Thus, the rarity of the case in this region forms the basis of this case report.

## Case Report

A 13-year-old male child presented with a 4-day history of severe throbbing headache and a 3-day history of vomiting which was effortless and nonprojectile. Vomiting was preceded by nausea of a few hours which resolved with onset of vomiting. There was no history of photophobia,

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neck pain, fever, or convulsions. He had neither previous episodes of headache nor ear discharge in the past. The child had ingested poorly cooked snails about 10 days before presentation. Some of his colleagues in his boarding school whom together had ingested the snails had similar symptoms as the index case as well as hyperesthesia in some and coma in one student who ingested raw snails.

At presentation, the child was afebrile (temperature 36.4°C) and had clinical features of raised intracranial pressure (ICP) of bradycardia, tachypnea, and hypertension. There were neither signs of meningeal irritation nor other CNS findings. The other systemic examination revealed no abnormality and his anthropometric measurements were normal. He developed paresthesia involving the hands and upper part of the face and eye pain on the 2<sup>nd</sup> day of admission. Ophthalmologic review showed a pale disc on fundoscopy.

Investigations done included a cranial computed tomography (CT) scan which was normal; a CSF analysis which showed a clear and colorless CSF which appeared to be under pressure (CSF manometry not done), white blood cell (WBC) count of 96 cells/mm<sup>3</sup> (30% lymphocytes and 70% polymorphs, polymorphs were however not further classified), and CSF protein and glucose which were within normal range. No organisms were seen on Gram stain or microscopy culture and sensitivity (m/c/s) of CSF.

Complete blood count showed total WBC count of 9300 cells/μl among which 8% were eosinophils (absolute eosinophil count - 744 cells/μL).

An assessment of suspected helminth-induced EoM was made based on the history, clinical features, and peripheral eosinophilia even though CSF eosinophilia was not confirmed. He was managed with analgesics, a 10-day course of albendazole, and a 2-week course of dexamethasone as well as repeated CSF taps (twice) with significant relief in headache following each lumbar puncture. He improved with no CNS sequelae on follow-up.

## Discussion

A travel and diet history in the presence of the typical clinical and laboratory findings are grounds on which the presumptive diagnosis of its most common form (helminth-induced EoM) is made.<sup>[2]</sup> While the presence of larvae or its antigen in CSF confirms this diagnosis, this often is not demonstrable.<sup>[1]</sup> In the index case, the consumption of poorly cooked snails 10 days before manifestation of the symptoms is in keeping with the typical diet history and incubation period of 1–4 weeks of *Angiostrongylus* infection.<sup>[1,2,7]</sup> The prominence of headache as a symptom in our

patient is similar to findings from earlier reports of cerebral angiostrongyliasis where it had been reported in about 90%–100% of these cases.<sup>[4,9,10]</sup> Other common clinical features include neck stiffness, fever, diplopia or blurred vision, nausea, vomiting, paresthesia and less commonly muscle weakness, orbital/retro-orbital pain, ataxia, abdominal pain, body aches, convulsions, cranial nerve palsies (commonly VII and VIII), somnolence, and urinary retention or incontinence.<sup>[4,9]</sup> Although the typical common features of neck stiffness, fever, diplopia, and blurred vision of meningitis were not seen in the index case, some of the other features such as vomiting, paresthesia, and orbital pain were noted in our patient and his colleagues, which were comparable to the earlier reported Nigerian case. Indeed, more florid symptoms were reported from the earlier Nigerian case<sup>[6]</sup> which suggests the possibility of an eosinophilic meningitis caused by *Gnathostoma spinigerum* known to be associated with more severe CNS manifestation.<sup>[4,9]</sup>

Investigations in EoM include a complete blood count which shows leukocytosis with eosinophilia. The diagnosis is made through a CSF analysis which often reveals a clear CSF with a high opening pressure, CSF eosinophilia (at least ten eosinophils/mm<sup>3</sup> of CSF or at least 10% eosinophils in the total CSF leukocyte count), with normal CSF glucose and normal/increased CSF protein though hypoglycorrhachia could occur occasionally.<sup>[1,7]</sup> The CSF m/c/s is often unrevealing, with helminth larvae seen in a few cases. Even though the CSF opening pressure was not measured, the significant relief of headache following the CSF tap was suggestive of a likely elevated CSF pressure in the index case. The CSF findings of normal CSF glucose and protein levels in the current case were comparable to earlier reports.<sup>[1,7]</sup> The presence of CSF eosinophilia was not clearly demonstrated in the index case due to failure to use the appropriate stain needed to differentiate eosinophils from neutrophils. Thus, the complete differentiation of the CSF WBC in the routine laboratory examination is important in the identification of EoM. However, the finding of a peripheral eosinophilia is suggestive of a possible EoM,<sup>[2]</sup> a finding present in the index case which combined with the history of snail ingestion, and clinical findings were the premise for making an assessment of suspected EoM in the patient.

Serologic studies using detection of antigens against preformed monoclonal antibodies, identification of specific IgG subclasses, as well as use of western blot analysis, demonstrating antibodies to specific antigenic bands in acute or convalescent sera can also be done to confirm the helminth infection.<sup>[4,11,12]</sup> This modality of investigation is currently not available at the institution where the patient was managed. The cranial CT finding of our patient which was normal is comparable with the

earlier Nigerian report. In addition, a review article by Ramirez-Avila *et al.*<sup>[4]</sup> described the cranial imaging of EoM due to *Angiostrongylus* as usually normal in contrast to that due to *Gnathostoma* which often reveals hemorrhage and hydrocephalus.

Pseudotumor cerebri, a condition characterized by increased ICP wherein headache and vomiting are common findings as well as a normal cranial imaging, was considered in the patient.<sup>[13]</sup> However, the presence of a cellular reaction in the CSF negated this differential diagnosis as CSF cell counts are always normal in pseudotumor cerebri.<sup>[13]</sup> Other parameters in the history such as seafood consumption, exposure to definitive hosts of the helminths, travel to areas endemic for EoM, and presence of common clinical features of EoM including neck stiffness, fever, nausea, and paresthesia are important diagnostic clues in favor of EoM which rules out pseudotumor cerebri.<sup>[2,4]</sup>

The mainstay of management in helminth-induced EoM is supportive as the illness is often self-limiting although a fatal outcome sometimes occurs.<sup>[2,5,7]</sup> Steroids have been reported to be beneficial in view of the host-related inflammation and are usually given for 2 weeks.<sup>[7]</sup>

The use of antihelminthics such as albendazole and mebendazole for days in isolation is controversial, but the use of steroid along with antihelminthics to reduce the inflammation appears beneficial.<sup>[1,7]</sup> This was the basis for which both drugs were used in the index case with a favorable outcome. Supportive measures such as use of analgesics and repeated CSF taps were also beneficial in our patient.

## Conclusion

EoM, though rare, is a form of meningitis that could occur in this environment. A high index of suspicion in the background of a history of snail ingestion and improved laboratory technique are important to ensure early diagnosis and prompt management.

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## Conflicts of Interest

There are no conflicts of interest.

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