

A Curious Case of Subacute Meningitis- Eosinophilic meningitis caused by *Angiostrongylus Cantonensis*

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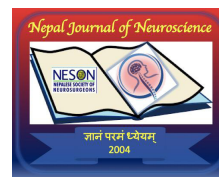
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Abstract

Presence of eosinophils in cerebrospinal fluid (CSF) is a very important clue for the aetiology of meningitis and has to be carefully looked for by an experienced pathologist. Most of the time history reveals the origin of eosinophilic meningitis (EM). *Angiostrongylus cantonensis* is the most common cause of eosinophilic meningitis worldwide. Peripheral eosinophilia and CSF eosinophils can increase in spite of anthelmintics and treatment should include steroids in addition to anthelmintics. Here we describe a case of eosinophilic meningitis following consumption of meat of monitor lizard who presented with headache and diplopia without fever.

Keywords: Eosinophilic meningitis, *Angiostrongylus cantonensis*, Monitor lizard, CSF Eosinophilia

Introduction

Angiostrongylus cantonensis larvae are neurotropic and is the most common parasitic cause of EM. EM due to *A. cantonensis* occurs principally in Southeast Asia, particularly Thailand and Malaysia and has been reported from most parts of the world. Humans get infected when they ingest raw or partially cooked snails or monitor lizards. It is possible to get infected by consuming snail/slug slime on produce or transferring mucus from hands to mouth after handling snails/slugs. Clinical manifestations usually occur 1 week to 1 month after exposure. Clinical spectrum can range from mild disease to meningitis or encephalitis. Most common symptoms are headache and fever. Symptoms often resolve spontaneously after 1-2 weeks and fatality is very rare. Treatment options include symptomatic treatment, antihelminthic therapy, steroids or a combination of these.

CASE

A 56-year-old man who is working as a forest office watchman presented with headache and vomiting for the past 3 weeks and

binocular diplopia for the last 5 days. He had fever, myalgia and lower abdominal pain lasting few days prior to the present symptoms. There was no h/o cough, diarrhoea, weight loss, night sweats. There was no history of seizures, altered behaviour, visual blurring, tinnitus, weakness, ataxia or bladder incontinence. He is a diabetic on oral hypoglycemic agents and has a history chronic kidney disease. There was no history of any analgesic or antibiotic use prior to his admission. On examination he was conscious, alert, oriented to place, time and person. He had bilateral papilledema, left lateral rectus palsy and terminal neck stiffness.

Routine blood investigations revealed hyperglycaemia, elevated blood urea, creatinine, mild hyponatremia, leucocytosis with normal C-reactive protein and procalcitonin. There was mild eosinophilia (Absolute Eosinophil Count 673/mm³). CSF study showed lymphocytic pleocytosis with 12% eosinophils. CSF protein was elevated and CSF glucose was normal. CSF culture and Gram staining was negative. CT head was unremarkable Figure [1]. Other investigations are shown in Table [1]. His Biofire CSF meningitis panel, mycobacterium tuberculosis PCR, Cysticercal Antibody, VDRL and Brucella antibodies were negative. He was treated with Albendazole and IV ceftriaxone. As he had persistent headache lumbar puncture was repeated after a week which showed CSF eosinophil count of 61% and CSF absolute eosinophil count (AEC) of 646 cells/mm³. [Table 2] There was peripheral eosinophilia (30% on Day 7) and AEC was 3069 cells/mm³. Subsequently he was started on short course of steroids and his symptoms subsided. On further enquiry he revealed that he had taken raw meat of monitor lizard as an aphrodisiac, few days prior to the onset of symptoms.

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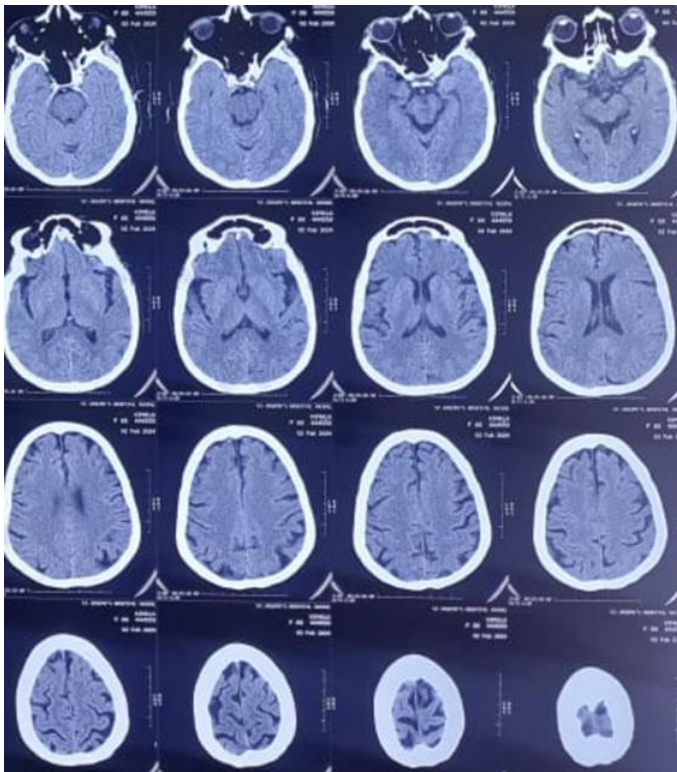


Figure 1: CT Head showing mild cerebral atrophy

Table 1: Blood

Blood Parameters	Result	Reference range
Fasting Blood sugar	207 mg%	70-110 mg%
Urea	65mg%	20-40mg%
Creatinine	1.54mg%	0.8-1.4 mg%
Haemoglobin	12.4gm%	12-16gm%
Total Count	11220 cells/mm ³	4000-11000 cells/mm ³
Neutrophils	70%	40-70%
Lymphocytes	24%	20-40%
Eosinophils	6%	2-6%
ESR	18 mm/Hr	<28 mm/Hr
C-Reactive protein	3.5mg/L	0-6 mg/L
Procalcitonin	0.41 ng/mL	<0.5 ng/mL
Sodium	132.4mEq/L	136-145 mEq/L
Potassium	4.1mEq/L	3.5-5.5 mEq/L
SGPT	18U/L	<40 U/L
SGOT	9U/L	<40 U/L

Table 2: CSF

CSF Parameters	Day 1	Day 8
Total count	1800 mm ³ /	1060/mm ³
Neutrophils	20%	0
Lymphocytes	68%	39%
Eosinophils	12%	61%
Protein	62.1mg%	108mg%
Sugar	93mg%	120mg%

DISCUSSION

The presence of eosinophils in the CSF is always considered an abnormal finding. EM is defined by counts higher than 10 eosinophils per ml or eosinophils constituting >10% of the total CSF leukocyte count. Although less than 2% of all meningitis cases have high CSF eosinophil counts, the presence of eosinophils is crucial for differential diagnosis and is thus extremely relevant. EM is a rare neurological disease which is often undiagnosed or underdiagnosed. Based on cases reported in literature, there have been only 2827 cases worldwide since 1945.¹ There are few recent case series from India.^{2,3,4} *Angiostrongylus cantonensis* (AC) (rat lung worm) is the most common parasitic cause of eosinophilic meningitis. A. cantonensis larvae are neurotropic and infection occur primarily via ingestion of stage 3 larvae of the parasite. Other important parasitic infections causing eosinophilic meningitis are *Baylisascaris procyonis* and *Gnathostoma spinigerum*. [Table 3] In general, human infection due to these organisms is self-limited as larvae do not replicate or mature to adult worms. Eosinophilic meningitis due to AC occurs principally in Southeast Asia, but is reported from other parts of the world. Humans are often infected with angiostrongyloides by eating poorly cooked snails. Snail slime may be a source for transmission of infectious larvae to other hosts. Eating undercooked shellfish, crabs, shrimps, lizards, frogs and drinking contaminated vegetable juice can also lead to infection.⁵ Another source of infection is raw or partially cooked monitor lizards. There is a popular belief that the tongue and the liver of the monitor lizard (*Varanus bengalensis*) has aphrodisiac properties. The liver, meat, tongue, and testes of monitor lizards are eaten in India, Sri Lanka, Thailand, and Laos, primarily by men who believe these organs will improve their strength and virility.⁶

Table 3: *Angiostrongyliasis Vs Gnathostomiasis*

Features	Angiostrongyliasis	Gnathostomiasis
Presenting symptom	Acute severe headache	Motor weakness
Migratory swelling	None	Yes
Pain	With focal numbness	Along nerve root
Peripheral eosinophilia	Yes	Yes
CSF appearance	Coconut juice	Non traumatic bloody
Brain imaging	No pathognomonic signs	SAH or unusual site ICH
Larval exposure	Uncooked snails or slugs	Uncooked poultry, fish

A. cantonensis is a zoonotic parasite that affects rats as the primary hosts. Sexually mature male and female worms reside in the pulmonary arteries of rats, where the females lay their eggs. First-stage (L1) larvae hatch and migrate into rat feces via the trachea and the gastrointestinal tract.

EM is rare in western countries where it is sometimes seen in association with tuberculosis, syphilis and coccidioidomycosis. EM has been reported with a variety of parasitic and fungal infections, also in non-infectious diseases like rheumatoid arthritis, lymphoma and with certain drugs.^{7,8} [Table 4] AC was first described by H T Chen who named it after Canton, China, where it was recovered. The clinical presentation of angiostrongyliasis ranges from self-limiting meningitis, eosinophilic meningitis, encephalitis, and radiculomyelitis to permanent neurologic injury or even death. 30–80% of patients with meningitic angiostrongyliasis have accompanying blood eosinophilia. If patients with suspected parasitic meningitis had an eosinophil count of more than 798 cells in their peripheral blood, the sensitivity and specificity of meningitis due to *A. cantonensis* is 76.6% and 80.2%, respectively.⁹ In a series of 484 patients with probable AC meningitis, headache was the most common symptom. Fever was uncommon. Lateral rectus palsy was noted in 3% cases. CSF was turbid with CSF cell count more than 500/mm³ in >75% cases.¹⁰ MRI brain may show single or multiple enhancing lesions with round, oval, stick-like or crescent shapes. It may show leptomeningeal enhancement, ventriculomegaly or T1 hyperintensity in globus pallidus and cerebral peduncle.^{11,12} A common feature of infection due to tissue helminths is the relatively greater severity of lesions and inflammatory reactions caused by dead parasites than those caused by live ones. This is a cause of concern for the use of anthelmintic drugs and emphasizes the need to use corticosteroids.¹³

Table 4: Causes of Eosinophilic meningitis

Helminthic infection	Angiostrongyliasis, Gnathostomiasis, Cysticercosis, Paragonimiasis, Schistosomiasis, Toxocariasis, Baylisascariasis, Paragonimiasis, Trichinellosis Strongyloidiasis, Filariasis, Hydatidosis Coenurosis, Myiasis
Bacterial	Syphilis, Tuberculosis, Group B Streptococcus
Viral	Lymphocytic choriomeningitis, Coxsackie virus
Fungal	Coccidioidomycosis, Cryptococcosis
Inflammatory	Rheumatoid arthritis, Behcet's, Sarcoidosis
Neoplastic	Lymphoma, meningeal carcinomatosis, Glioblastoma
Drugs	Ciprofloxacin, Ibuprofen, Amoxicillin Trimethoprim/sulphamethoxazole

In conclusion presence of eosinophils in CSF is a very important clue for the aetiology of meningitis and has to be carefully looked by an experienced pathologist. Most of the time history reveals the origin of EM. Peripheral eosinophilia and CSF eosinophils can increase in spite of anthelmintics and treatment should include steroids in addition to anthelmintics. In general, eosinophilic meningitis has a favourable prognosis.

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