

Neurocysticercosis epilepsy diagnosed by Magnetic Resonance Imaging

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ABSTRACT

Neurocysticercosis is prevalent in most developing countries where pork is consumed. It is estimated that approximately 30% of cases of epilepsy may be due to neurocysticercosis. We present a case of a middle-aged man who presented to a health facility in the city of Juba in South Sudan with tonic-clonic seizures and left-sided weakness. He was originally diagnosed as having epilepsy and Transient Ischaemic Attacks (TIA). Post-seizure confusion and odd behaviour prompted referral to a psychiatrist but was referred to the Juba Medical Complex (JMC) for a medical opinion and further management. The diagnosis of cysticercosis was confirmed on Computerised Axial Tomographic (CAT) scanning and Magnetic Resonance Imaging (MRI). Verbal consent was obtained from the patient to publish his clinical details anonymously.

Keywords: cysticercosis, epilepsy, albendazole, praziquantel, *Taenia solium*

Introduction

Neurocysticercosis is an infection of the central nervous system (CNS) and its meninges by the larval stage of the pork tapeworm *Taenia Solium*. *T Solium* infestation is endemic in low-income countries such as South Sudan where pigs are reared.^[1,2] It is the most frequent preventable cause of recurrent seizures and epilepsy in countries where cysticercosis is endemic.^[3] It seems to be infrequently considered as it is rarely mentioned in usual clinical practice. It is related to poverty and poor hygiene and is of high public health importance.^[1]

Case Report

A previously healthy 55-year-old South Sudanese male civil servant presented to a health facility in the city of Juba five days before referral to the JMC with a brief episode of sudden onset of dizziness. This was preceded by a sensation of objects in motion followed by a fall soon after generalized seizures occurred. After the cessation of the seizures, he developed left-sided weakness and confusion. The patient was initially admitted to a health facility elsewhere, where a diagnosis was made of either a transient ischaemic attack (TIA) or stroke. The history of seizure led to treatment initially with phenytoin (the dose nor route of administration were indicated in the letter of referral). Due to the history of confusion and unusual behaviour following the seizure, he was referred to a psychiatrist. On arrival at the

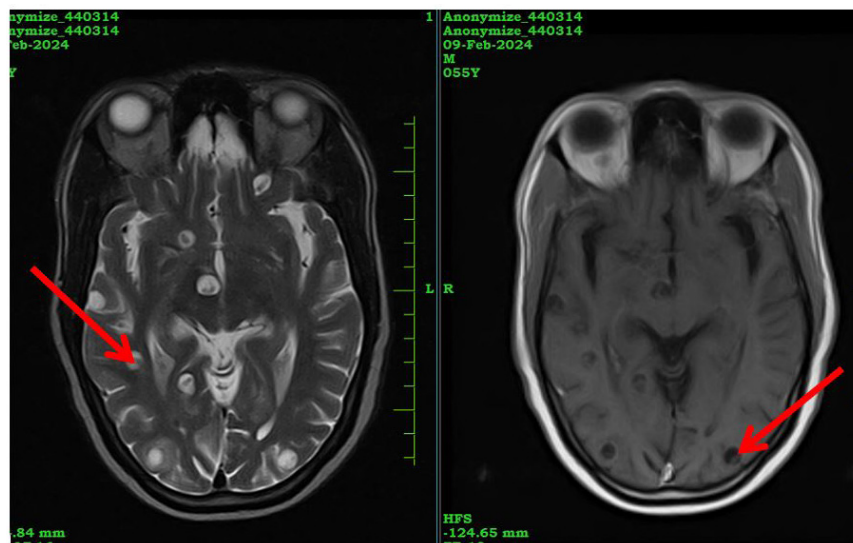


Figure 1. Brain MRI scans: Red arrows show cysticerci bright on T2 image (left) and dark on T1 image(right)

Radiologist's report on the Brain MRI scans:

- Multiple small cystic lesions with eccentric hypointense foci/scolices within them are scattered in both cerebral hemispheres, right basal ganglia, mid brain on right side and in the right cerebellum. A few of the lesions show peripheral enhancement and mild perilesional oedema without any significant mass effect.
- Similar lesions are also seen in the right orbit, in the right masticator space as well as in the soft tissues of the face on right side.
- Features are compatible with multifocal cysticercosis.

JMC, brain Computerized Axial Tomographic (CAT) and Magnetic Resonance Imaging (MRI) scans were carried out. The MRI scan confirmed cysticercosis causing the seizure.

He was unaccompanied to the consultation. He was found to be lucid, and able to tell the history of his condition. He denied ever suffering from epilepsy or other major illness except hypertension for which he received amlodipine. There was no history of alcohol consumption, cigarette smoking or use of recreational drugs. He was married and worked in the civil service of the government of South Sudan. There were no known allergies and his prescribed medications from the referring clinic and by the psychiatrist consisted of olanzapine, rosuvastatin, amlodipine, carbamazepine, aspirin and Cervitam, respectively. Cervitam is complementary treatment supposedly for remedying symptoms of cognitive impairment.

On examination he had a pulse of 78 beats per minute with a blood pressure (supine) 145/70 mmHg His temperature was 36.5°C. The reported left hemiparesis noted soon after the seizure had resolved, and power in all limbs was normal. The other symptoms that were initially noted at presentation five days earlier had completely resolved. The remainder of the physical examination was normal.

The following investigations were normal: full blood count, liver function tests, human immunodeficiency viral (HIV) serology, lipid profile, VDRL, serum calcium, serum magnesium, phosphate levels, chest X-ray, 12-lead electrocardiogram (ECG), transthoracic echocardiogram and carotid doppler duplex scan.

Clinical diagnoses

1. Seizures secondary to widespread brain involvement with cysticerci.
2. Todd's paralysis secondary to the tonic-clonic seizure.

The decision after consideration of all the clinical information and the various investigations led to the decision to manage the patient as an outpatient. He was commenced on albendazole 7.5mgs per kilogram body weight twice a day for up to thirty days, pending review in the outpatient clinic after ten days. A repeat brain MRI will be considered after thirty days. The alternative would have been praziquantel had it been available. The drugs he was prescribed at the initial health facility were discontinued, except for the carbamazepine. Although this drug is usually a second-line antiepileptic drug for the management of generalized seizures, it was retained because he had responded to it. His serum sodium will be monitored because carbamazepine may cause hyponatraemia. In the event of recurrence of seizures levetiracetam may be considered. The anti-psychotic medication prescribed by the psychiatrist was discontinued as his confusion and strange behaviour was likely due to a post-ictal state. He received a course of dexamethasone to avert an allergic reaction from the dying cysticerci in the brain.

Discussion

This previously well 55-year-old man suffered episodes of generalized seizures secondary to cysticercosis. Confusion

and loss of consciousness after a seizure are common and referred to as a post-ictal state. Typically, it is characterized by confusion, drowsiness, hypertension, psychiatric features, headache, and nausea. It may last 30 minutes to twenty-four hours.^[4]

The best way to control cysticercosis is the institution of rigorous meat inspection, especially pork, and hygienic methods of rearing pigs. The public must be informed to cook pork thoroughly to avoid ingestion of live *T. solium*.

Initially the patient denied eating pork in the recent past but after some recollection he remembered eating roasted pork some years previously in one of the hotels in Juba. Since then, he has not consumed pork. It is possible that poor hygienic conditions in the city may have contributed to contracting infection with *T. solium*.

Neurocysticercosis occurs following eating of undercooked, raw or under roasted pork that is infected with the worm, *T. solium*, or from drinking contaminated water with stool containing *T. solium*.^[5]

Unlike the other types of tapeworms, such as *T. saginata*, which infects cattle, this latter type of tapeworm is acquired by eating raw beef. Both the pig and the cow are the primary hosts and human beings are the secondary host.

T. solium eggs attach to the intestinal endothelium, where they mature into adult tape worms. Some of the eggs may enter the circulation and are disseminated throughout the body, becoming cysticerci within the human secondary host. These can be found in the muscles, myocardium, eyes, and the skin causing subcutaneous nodules all over the body. In the eyes it can lead to conjunctivitis, uveitis, retinitis, choroidal atrophy, and blindness. The eggs in the brain cause neurocysticercosis, which is a common cause of seizures in the countries rearing pigs in an unhygienic environment. Some observed common central nervous system symptoms include hemi-paresis/-plegia, odd behaviour, dementia, hydrocephalus, basal meningitis, cranial nerve symptoms, and in the spine, it can cause radicular or compressive symptoms. Some of my patient's symptoms were attributable to a post-ictal state, and others to the direct involvement of the brain by cysticerci.

The diagnosis of neurocysticercosis should be suspected in all patients, in low-income countries, who present with a seizure. Brain imaging using CAT and MRI scans is crucial as the latter demonstrate the presence of cysticerci (Figure 1). Additional tests include stool microscopy and anal swabs looking for the ova of *T. solium*, serology using

indirect haemagglutinin test, and cerebral spinal fluid (CSF) antigen test looking for eosinophils and detection of *T. solium* antigens in the CSF.

Treatment consists of control of seizures using a suitable available anti-epileptic medication such as phenytoin, which can be administered intravenously and orally, levetiracetam and others depending on availability. In the UK first line treatment tends to be lamotrigine and levetiracetam both for focal onset and generalised seizures. Since neurocysticercosis causes a focal brain injury it may reasonably be assumed that the seizures have a focal onset, even if this rapidly becomes generalised. Hence, most antiepileptic medications should be effective. In the event of lamotrigine and levetiracetam not being available then carbamazepine^[6] is a reasonable first choice as it has less adverse effects than phenytoin and phenobarbitone.

Albendazole given at 7.5mg/kg twice daily for 8 – 30 days or alternatively praziquantel will kill the cysticerci. An allergic reaction from the dying *T. solium* larvae may result in aggravation of symptoms and hence, the co-prescription of dexamethasone at 0.1mgs per kilogram body weight per day for 29 days or whatever period the patient is on the anthelmintic medication. This may ameliorate this reaction, although steroids remain controversial.^[5]

It was planned to review the patient after a month to assess the control of his seizures and repeat brain imaging. However, he did not attend the clinic for review. Efforts to trace his whereabouts through the referring doctor and relatives have been unsuccessful so far. If he should be located and reviewed a supplementary report will be submitted to the SSMJ.

Conflict of interests: None

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