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Case Report

A rare case report on neurocysticercosis – A parasitic disease

Jyothi Basini[1]*, Hemalatha J[1], Prathyusha M[1], Shaheera G[1]

[1] *Seven Hills College of Pharmacy (Autonomous), Tirupati, Andhra Pradesh, India*

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ABSTRACT

Neurocysticercosis is commonly known as cysticercosis, which is the most common parasitic disease of the human nervous system caused by the parasitic tapeworm *Taenia solium.* The development of lesions in the brain and leptomeninges and the consequent onset of symptoms associated with NCC is mainly due to the host immune-inflammatory response. The absolute diagnostic criteria include histological conformation of parasites, evidence of subretinal cysts, and demonstration of the scolex within a cyst. It is treated by a course of steroids or immunosuppressants; for intravascular cysts, endoscopic surgery is the procedure of choice as it is minimally invasive.

We present a case of 8-year-old female patient who was admitted to the Neurology ward with the chief complaints of loss of consciousness, involuntary movements, headache, fever, and onset of seizures associated with vomiting. She had a seizure episode at the age of 2 years associated with fever, but no treatment was done. She was not on any past medication and was hemodynamically stable. Her lab investigations of magnetic resonance imaging show infective granuloma in the left parietal lobe with mass effect as described above, suggesting neurocysticercosis, which should be carefully observed at an early stage. We summarized the case report of neurocysticercosis, its diagnosis, and treatment plan.

1. Introduction

The most prevalent helminthic infection of the nervous system, neurocysticercosis (NCC), is a leading global cause of acquired epilepsy. The illness develops when humans consume the eggs of the tapeworm *Taenia solium (T. solium)* through contact with an asymptomatic *Taenia* carrier, thereby becoming intermediate hosts of the tapeworm. The nervous system is home to parasites that can settle in the brain parenchyma, subarachnoid space, ventricular system, or spinal cord.[1] These pathological changes, which can vary depending on the number, size, and location of the parasites as well as the intensity of the host's immune response to them, are what cause the clinical pleomorphism in its presentation.[1,2] The clinical picture of NCC is due to the parasite itself and/or an inflammatory reaction around degenerating cysts in the central nervous system (CNS). It may cause chronic meningitis, hydrocephalus, epilepsy, focal neurological signs, and intracranial hypertension are the most common clinical manifestations of the disease.[3]

Neurocysticercosis symptoms are seizures (70%), headache, nausea, vomiting and confusion (cysticercal encephalitis). Abnormal physical findings, which occur in 20% or less of patients with NCC, depend on where the cyst is located in the nervous system and include the following: cognitive decline, dysarthria, extraocular movement palsy or paresis, hemiparesis or hemiplegia, stiff neck.[4] The diagnosis of NCC is based on clinical data, neuroimaging abnormalities, and the results of immunological tests. The diagnosis is greatly facilitated by the use of computer tomography (CT) scan, magnetic resonance imaging (MRI),

* *Corresponding author.*
E-mail address: jyothiphdcologyvmk@gmail.com (J. Basini).

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and serological tests. Praziquantel and albendazole now offer a reasonable treatment for neurocysticercosis.

Generally, NCC is caused by the CNS infection with the pork tapeworm *Taenia solium,* which is endemic in most low-income countries where pigs are raised. This form of cysticercosis is a relevant cause of seizures in endemic areas. A person gets NCC by swallowing microscopic eggs passed in the feces of a person who has an intestinal pork tapeworm.

2. Case Report

A female patient of 8 years was admitted with chief complaints of a full term with normal developmental milestones, with no previous co-morbidities, and came with complaints of seizure-like episodes since one day. Semiology (while sleeping in the morning) patient's father tried to wake her up; he noticed a staring look with a deviation of eyes towards the right side with loss of consciousness for 2 to 3 min followed by post-ictal confusion for 20 to 30 min. There is no history of tongue bites. Past history of 1 episode of seizure-like activity at the age of 2 years, not on medication. She had involuntary movements of her lips in the morning on the admitted day. And had a complaint of seizure-like episodes associated with 2 episodes of vomiting. She had a past medical history of seizure episodes associated with fever but was not treated. Her Erythrocyte Sedimentation Rate (ESR) was 10 mm/hr, and all other vitals were normal. CT scan reports are a well-defined isodense lesion to grey matter with central hypodensity in the small hyperdense focus within showing adjacent mild perilesional edema in the left parietal lobe, probably neurocysticercosis.

NCC with new-onset seizures of left parietotemporal ring enhancing lesion reported, infective granuloma in left parietal lobe with mass effect came for follow up after discharge no recurrence of seizures, last attack on 13th Feb 2024 completed 14 days of albendazole dose. Complaints of headache, occasional episodes of one-hour duration. The patient has been using 20 mg cyclone since 15/03/2024, 15 mg once a day. Hence, her father complained of a 4.5 kg weight gain in the patient due to the usage of medications. Systemic examination of pulse rate was 79 bpm, blood pressure was 112/76 mm of Hg, peripheral oxygen saturation (SpO_2) was 98%, respiratory rate was 21/min, and temperature-afebrile. The patient was diagnosed with NCC right focal motor seizure with impaired awareness.

Generally, NCC can be diagnosed based on a single finding in only 3 scenarios: Observation of the scolex of a cysticercus (appearing as a "dot" in the center of the cyst) on neuroimaging. Visualization of a cysticercus behind the retina on ophthalmologic exam. It is commonly diagnosed with the routine use of diagnostic methods such as CT and MRI of the brain. CT scan of the brain in a patient who presented with an episode of generalized tonic-clonic seizure.[5,6] The complement fixation test and the enzyme-linked immunosorbent assay (ELISA) in the Cerebrospinal fluid (CSF) are highly sensitive and specific in cases of subarachnoidal neurocysticercosis. Histological demonstration of the parasite is from the biopsy of a brain or spinal cord lesion.

Plan: She had been managed with medications (Table 1).

3. Discussion

Taeniasis/cysticercosis is targeted for control success and considered a steady increase in the number of countries with intensified control in hyperendemic areas (increasing from 2-3% in 2020 to 4-6% in 2023, to 9-14% by 2025, and to 17-27% by 2030). Cross-cutting targets that include 100% access to at least basic water supply, sanitation, and hygiene in areas endemic for neural tube defects (NTDs) and 75% integrated treatment coverage for preventative chemotherapy will additionally impact the taeniasis/cysticercosis/NCC complex. Cysticercosis develops when, following ingestion of *T. solium* eggs, *T. solium* larvae migrate and become encysted, typically in the muscle tissue of the host. Meanwhile, pigs can harbor thousands of cysts. When *T. solium* cysticerci develops in the human brain, the condition is defined as NCC.[1] An estimated 2.5 to 8.3 million people worldwide are affected by NCC, the most prevalent parasitic disease of the central CNS, which results in 2.8 million disability-adjusted life years globally. 30% of epilepsy cases in areas where *T. solium* is endemic are thought to be caused by NCC. This is a major clinical consequence of *T. solium* infection and the predominant cause of preventable epilepsy worldwide, associated with morbidity and mortality from epileptic seizures and epilepsy-related death. People are at a higher risk for getting neurocysticercosis by swallowing parasite eggs if they:

1. Have a pork tapeworm infection (this is called autoinfection)
2. Live in a household with someone who has a pork tapeworm.
3. Eat food made by someone with a pork tapeworm infection.

In general, most of the people in the United States with neurocysticercosis are people who come from regions where the disease is common, including Latin America.[7]

Neurocysticercosis is a preventable disease. Good hand-washing practices and treating people infected with intestinal tapeworms could drastically reduce the number of new infections. As there is currently no vaccine for humans, the only method of preventing infection is educating the public about the life cycle of a complex zoonosis in order to encourage behavioral change. These efforts are supported by practical control measures such as the administration

Table 1: Medication chart for neurocysticercosis

S. No.	Drug	Dose	Route	Frequency
1.	Inj. Levetiracetam	5 ml	IV	1-0-1
2.	T. Levetiracetam	250 mg	Oral	1-0-1
3.	T. Calcium + Vitamin D3	1,250 mcg + 15 mcg	Oral	OD
4.	T. Pantaprazole	40 mg	Oral	OD
5.	T. Prednisolone	50 mg	Oral	OD
6.	T. Prednisolone	50 mg	Oral	OD
7.	T. Dexamethasone	4 mg	Oral	OD
8.	T. Albendazole	400 mg	Oral	1-0-1

of albendazole and praziquantel, which are commonly used in Mass Drug Administration (MDA) deworming programs, surgery when necessary, and efficient vaccination and deworming programs for pigs that are backed by meat inspection. Neurocysticercosis is a major public health problem in developing countries and is emerging as an increasingly important condition in regions in which the disease is not endemic.[4] Appropriate legislation, health education, modern swine husbandry techniques, increased meat inspection coverage and efficiency, hygienic facility provision, human tapeworm carrier detection and treatment, and adequate sanitation are all components of comprehensive long-term intervention programs.[8]

4. Conclusion

Neurocysticercosis is a complex neurological condition caused by the larvae of the pork tapeworm. This case report underscores the importance of early diagnosis and intervention in NCC, a significant parasitic disease affecting the human nervous system. The case of the 8-year-old female patient highlights the diverse clinical manifestations, including seizures and headaches, necessitating thorough neurological and imaging evaluations. The MRI findings of an infective granuloma in the left parietal lobe are indicative of NCC, reinforcing the need for prompt medical attention. Treatment involving steroids, immunosuppressants, and potentially minimally invasive endoscopic surgery, depending on cyst location, can significantly improve patient outcomes. Vigilance and early management are crucial in mitigating the impact of this parasitic infection. Hence, early detection, appropriate treatment, and public health interventions are crucial for managing and preventing its spread and complications.

5. Summary

Neurocysticercosis (NCC), also known as taeniosis and cysticercosis, is the most common parasitic disease affecting the human nervous system, caused by the tapeworm *T. solium*. It leads to the development of brain and leptomeningeal lesions, primarily due to the host's immune-inflammatory response. Absolute diagnostic criteria for NCC include histological confirmation of the parasite, evidence of subretinal cysts, and demonstration of the scolex within a cyst. Treatment typically involves steroids or immunosuppressants, with endoscopic surgery as a minimally invasive option for intraventricular cysts.

This case report details an 8-year-old female patient admitted with loss of consciousness, involuntary movements, headache, fever, and seizures associated with vomiting. An MRI revealed an infective granuloma in the left parietal lobe, suggestive of NCC. The patient's history included a seizure episode at age 2, previously untreated. This case highlights the necessity for early diagnosis and intervention to effectively manage NCC and prevent further complications.

6. Source of Funding

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7. Conflict of Interest

None.

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Author biography

Jyothi Basini, Professor https://orcid.org/0000-0003-1276-0376

Hemalatha J, Student

Prathyusha M, Student

Shaheera G, Student

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