IOSR Journal Of Pharmacy And Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 19, Issue 6 Ser. 2 (Nov. – Dec. 2024), PP 14-17
www.Iosrjournals.Org

A Case Report On Neurocysticercosis

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Abstract
*Neurocysticercosis (NCC) is a parasitic infection of the central nervous system caused by the larval stage of *Taenia solium*. It is a significant public health issue in endemic regions due to its association with poor sanitation and hygiene practices. This condition presents a diverse spectrum of clinical manifestations ranging from seizures and headaches to cognitive deficits and hydrocephalus, influenced by the location and stage of cysticerci. Diagnosis is established through imaging techniques like MRI or CT scans, supported by serological and CSF analyses. Treatment involves a combination of antiparasitic agents, corticosteroids to manage inflammation, and symptomatic therapies such as antiepileptic drugs. Surgical interventions may be required in cases of obstructive hydrocephalus or large cysts. This case emphasizes the importance of early diagnosis, multidisciplinary management, and public health measures in controlling NCC.*

Keywords: *Cysticerci, Oncospheres, Perilesiona, ELISA, EITB*

Date of Submission: 26-11-2024 Date of Acceptance: 06-12-2024

I. Introduction

Neurocysticercosis is a parasitic infection of the central nervous system caused by the larval stage of the pork tapeworm, Taenia solium. This condition occurs when the eggs of the tapeworm are ingested, typically through contaminated food or water. The larvae then migrate to the brain, spinal cord, or other tissues, where they form cysts. Neurocysticercosis is also commonly referred to as "cysticercosis of the central nervous system" or simply "cerebral cysticercosis." These terms are often used interchangeably to describe the parasitic infection of the central nervous system caused by the larval stage of the pork tapeworm, Taenia solium. Neurocysticercosis can cause a variety of neurological symptoms, including seizures, headaches, cognitive impairment, and even coma in severe cases. It is a significant public health concern in areas where sanitation and hygiene practices are poor, as well as in regions where pork consumption is common. Treatment typically involves medications to kill the parasites and manage symptoms, although surgery may be necessary in some cases.

II. Epidemology

Neurocysticercosis is most commonly reported in low- and middle-income countries in Latin America, Asia, and sub-Saharan Africa. However, with increasing globalization and migration, cases are also being reported in high-income countries among immigrant populations from endemic regions. Within endemic areas, the prevalence of Neurocysticercosis can vary widely. In some communities, particularly rural areas with limited access to clean water and sanitation facilities, prevalence rates can be high. Factors such as pig farming practices, open defecation, and lack of awareness about food safety contribute to transmission.

III. Etiology

1. **Consumption of Contaminated Food:** Ingestion of food or water contaminated with eggs of the pork tapeworm (Taenia solium) is the primary mode of transmission. Poor food hygiene practices and inadequate sanitation contribute to the spread of the parasite.
2. **Pig Farming Practices:** In regions where pig farming is common, improper pig management practices such as allowing pigs to feed on human feces containing tapeworm eggs can lead to the transmission of Taenia solium to humans.

3. **Lack of Adequate Sanitation:** Communities with limited access to clean water and sanitation facilities are at higher risk. Open defecation and improper waste disposal increase the likelihood of environmental contamination with tapeworm eggs.
4. **Cultural and Dietary Practices:** Consumption of undercooked pork containing cysts of Taenia solium larvae can result in infection. Cultural practices that involve consuming raw or undercooked pork, or traditional dishes made with raw pork, contribute to transmission.
5. **Poor Meat Inspection:** Inadequate meat inspection practices in some regions allow infected pork to enter the food supply chain, increasing the risk of infection for consumers.
6. **Lack of Awareness:** Insufficient knowledge about proper food handling and hygiene practices, as well as limited awareness of the risks associated with neurocysticercosis, contribute to its prevalence in affected communities.
7. **Migration and Travel:** Movement of infected individuals from endemic regions to non-endemic areas can introduce the parasite to new populations and increase the risk of transmission in previously unaffected areas.
8. **Environmental Factors:** Socioeconomic factors, including poverty and overcrowded living conditions, can exacerbate the risk of neurocysticercosis transmission by facilitating the spread of the parasite within communities.

IV. Pathogenesis

Neurocysticercosis is caused by the larval stage of *Taenia solium* when humans become intermediate hosts through ingestion of eggs via fecal-oral contamination or auto-infection. Once ingested, the eggs hatch in the intestine, releasing Oncospheres that penetrate the intestinal mucosa and enter the bloodstream. These Oncospheres migrate to various tissues, including the central nervous system (CNS), where they develop into cysticerci. In the CNS, the cysticerci elicit minimal immune response initially due to their protective tegument. Over time, as the cysticerci degenerate, they release antigens, triggering an intense inflammatory reaction. This leads to perilesional edema, gliosis, and calcification. The location, size, and number of cysts, along with the host's immune response, determine the clinical manifestations, which may include seizures, headache, focal neurological deficits, and hydrocephalus. The pathogenesis highlights the role of host-parasite interaction in disease progression and symptomatology

V. Types Of Cysts

In neurocysticercosis, cysts formed are typically referred to as cysticerci. These cysticerci are the larval stage of the pork tapeworm, Taenia solium. They develop within various tissues of the body, including the central nervous system (CNS), leading to neurological symptoms and complications.

There are two main types of cysts formed in neurocysticercosis:

1. **Vesicular (Active) Cysts:**

- Vesicular cysts are the early stage of neurocysticercosis.
- They contain a fluid-filled cavity (vesicle) surrounded by a translucent membrane, within which the scolex (the head of the tapeworm) may be visible.
- Vesicular cysts are considered active because they contain live larvae (cysticerci) and are potentially infectious.
- These cysts are typically found in the parenchyma of the brain or spinal cord.

2. **Colloidal (Inactive) Cysts:**

- Colloidal cysts are the later stage of neurocysticercosis.
- They result from degeneration and calcification of vesicular cysts over time. Colloidal cysts lack the fluid-filled vesicle seen in active cysts and appear as solid, calcified lesions on neuroimaging studies.
- These cysts are considered inactive and do not contain viable larvae.
- However, they may still cause symptoms and complications due to the inflammatory response they elicit.

VI. Clinical Manefestations

- **Seizures:** Neurocysticercosis is one of the leading causes of seizures in endemic regions. Seizures may vary in severity and frequency, ranging from focal seizures to generalized tonic-clonic seizures.
- **Headaches:** Chronic headaches are a common symptom of neurocysticercosis, often described as dull or throbbing in nature. Headaches may be localized or diffuse and may worsen over time.
- **Cognitive Impairment**: Neurocysticercosis can lead to cognitive dysfunction, including memory loss, difficulty concentrating, and impaired executive function. In severe cases, cognitive impairment may significantly impact daily functioning.

- **Focal Neurological Deficits:** Depending on the location and size of the cysts, neurocysticercosis may cause focal neurological deficits such as weakness, sensory disturbances, visual changes, or speech difficulties.
- **Behavioral Changes:** Some individuals with neurocysticercosis may experience behavioral changes, including irritability, mood swings, or personality changes. These changes may be subtle or pronounced, depending on the extent of neurological involvement.
- **Visual Disturbances:** Cysts located near the optic nerves or visual pathways can lead to visual disturbances, such as blurred vision, double vision (diplopia), or loss of visual field.
- **Hydrocephalus:** In some cases, neurocysticercosis can obstruct the flow of cerebrospinal fluid (CSF) within the brain, leading to hydrocephalus. Symptoms of hydrocephalus may include headaches, nausea, vomiting, and changes in mental status.
- **Increased Intracranial Pressure (ICP):** Large or multiple cysts in the brain can cause an increase in intracranial pressure, resulting in symptoms such as nausea, vomiting, papilledema (swelling of the optic disc), and altered consciousness.
- **Psychiatric Symptoms:** Rarely, neurocysticercosis may present with psychiatric symptoms such as hallucinations, delusions, or psychosis. These symptoms may be mistaken for primary psychiatric disorders if the underlying neurological cause is not recognized.
- **Acute Intracranial Complications:** In severe cases, neurocysticercosis can lead to acute intracranial complications such as cyst rupture, intracerebral hemorrhage, or meningitis, which may present with sudden-onset neurological deficits or altered mental status.

VII. Diagnostic Tests

Computed Tomography (CT) is essential for detecting cystic lesions in the brain and spinal cord. CT scans are particularly useful for identifying calcified cysts, while MRI provides superior soft tissue resolution and can detect both active and inactive cysts. Enzyme-linked immunosorbent assays (ELISA) and enzyme-linked immunoelectrotransfer blot (EITB) assays can detect antibodies to Taenia solium in the blood or cerebrospinal fluid (CSF). These tests can support the diagnosis of neurocysticercosis, but false-positive and false-negative results can occur, especially in regions where the parasite is endemic. Lumbar puncture and analysis of cerebrospinal fluid (CSF) may reveal elevated protein levels, lymphocytic pleocytosis, and eosinophilia in patients with neurocysticercosis. CSF examination can help rule out other causes of neurological symptoms and may show evidence of inflammation or cysticercal antigen presence. EEG may be useful in evaluating patients with seizures or suspected epilepsy due to neurocysticercosis. It can help characterize seizure activity and guide treatment decisions.

VIII. Treatment

The treatment of neurocysticercosis typically involves a combination of antiparasitic medications, corticosteroids, and symptomatic management. The specific treatment approach depends on factors such as the number and location of cysts, severity of symptoms, and individual patient factors.

1. **Antiparasitic Medications:**
   - **Albendazole:** Albendazole is the most commonly used antiparasitic medication for treating neurocysticercosis. It works by killing the larvae (cysticerci) of the pork tapeworm. Albendazole is typically given orally for duration of several weeks to months, depending on the severity of the infection.
   - **Praziquantel:** Praziquantel is another antiparasitic medication that may be used alone or in combination with Albendazole for the treatment of neurocysticercosis. Like Albendazole, Praziquantel is effective in killing the cysticerci and reducing parasite burden.
2. **Corticosteroids:** Corticosteroids such as dexamethasone or prednisone are often prescribed to reduce inflammation and cerebral edema associated with neurocysticercosis. Corticosteroids help alleviate symptoms such as headaches and seizures and may be used adjunctively with antiparasitic medications. Steroid treatment is usually initiated before or concomitantly with antiparasitic therapy and tapered gradually over several weeks to prevent rebound inflammation.
3. **Symptomatic Management:** Treatment of neurological symptoms associated with neurocysticercosis may include antiepileptic drugs (AEDs) for seizure control, analgesics for headache relief, and supportive measures to manage other symptoms such as cognitive impairment or focal neurological deficits. Patients with hydrocephalus or increased intracranial pressure may require additional interventions such as ventricular shunting to alleviate CSF obstruction and reduce intracranial pressure.
4. **Surgery:** Surgical intervention may be necessary in some cases of neurocysticercosis, particularly for patients with obstructive hydrocephalus, large intraventricular cysts, or cysts causing mass effect and neurological deterioration. Surgical options may include cyst removal, ventriculoperitoneal shunting, or endoscopic procedures for cyst decompression and removal.

IX. Case Presentation

A 32-year-old male patient presented to King George Hospital (KGH), Visakhapatnam, with complaints of recurrent seizures, headache, and vomiting for the past two weeks. He had no significant past medical history and reported consuming undercooked pork regularly. Neurological examination revealed focal deficits. MRI of the brain showed multiple ring-enhancing lesions with perilesional edema, consistent with neurocysticercosis. ELISA serology for *Taenia solium* antibodies confirmed the diagnosis. The patient was initiated on antiepileptic therapy with Levetiracetam and antiparasitic treatment with Albendazole (15 mg/kg/day) combined with a corticosteroid (dexamethasone) to reduce inflammation. He was also provided supportive care, including proton pump inhibitors to prevent gastric irritation. Follow-up imaging showed a reduction in lesion size and improvement in symptoms. This case underscores the importance of imaging and serological tests in diagnosing neurocysticercosis, particularly in endemic regions.

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