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TEACHING FILES (GRAND ROUNDS)

PAEDIATRIC NEUROCYSTICERCOSIS: A CASE HIGHLIGHTING THE SIGNIFICANCE OF DIETARY AND ADVANCE NEUROIMAGING

Rutuja Patil, Ramchandra Babar.

Department of Paediatrics, MAM's SSAM's Sane Guruji Hospital, Hadapsar, Pune, Maharashtra, India.

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Clinical Problem:

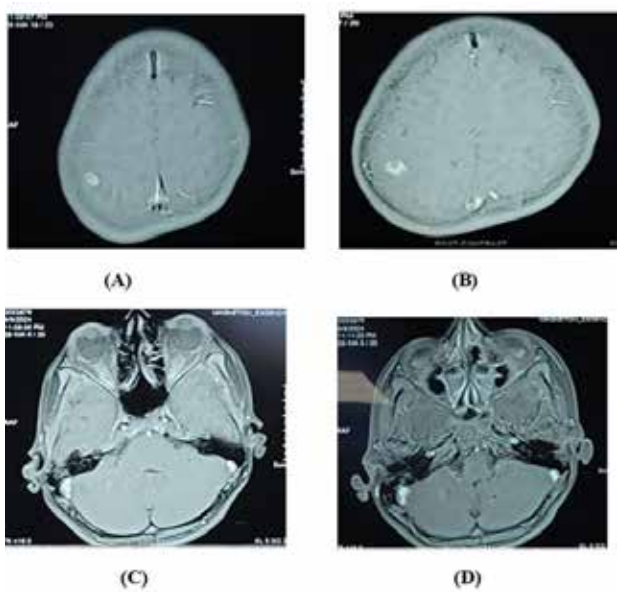
A 13 year old female patient brought by relatives to pediatric outpatient department with sudden, new-onset seizure. Her family reported witness twitching movements of her arms and legs that lasted for 5-10 min. She was brought to the hospital while experiencing generalized tonic-clonic seizures, along with sudden onset of headache and vomiting. There was no history of fever or trauma. On examination, she was afebrile and actively convulsing, with a heart rate of 130 bpm, respiratory rate of 30 breaths/min and SpO2 of 98% on room air. Her Glasgow Coma Scale (GCS) score was 9, blood sugar level (BSL) was 138 mg/dL and pupils were equal and reactive to light. Neurological examination revealed nystagmus, hyper-responsiveness and disorientation. Respiratory and cardiac examinations were unremarkable. She has mixed dietary pattern with routinely ingestion of pork meat in her area. While providing her medical history, she complained of worsening headache nausea accompanied by scanty, non-bilious vomiting which culminated in generalized convulsions. Convulsions get reduced after introducing antiepileptic drug-Levetracetam (20 mg/kg), along with sedative clonazepam (0.25 mg/kg). All routine investigations sent were within normal limits. MRI brain was done under sedation to rule out any intracranial pathology, findings raised suspicion of NCC or tuberculoma. CSF was performed to rule out tuberculoma was within normal limits. MR Spectroscopy was done to confirm the diagnosis. Findings were more in favour of NCC that confirm the diagnosis. The patient was started on albendazole as an anthelmintic, dexamethasone as a glucocorticoid and levetracetam as antiepileptic medications.

What is the importance of diet history and Neuroimaging in this case?

Discussion

Neurocysticercosis (NCC) is the most common parasitic infection of the central nervous system (CNS) caused by the larval form (Metacestode) of the Taenia solium tapeworm. It is the common identifiable cause of new onset of seizures in several regions of world including India.[1] NCC is a significant acquired cause of active epilepsy and other neurological conditions, with a prevalence estimated at 4.5 cases per 1,000 individuals in rural northwest India. It is one of the leading causes of preventable epilepsy in many developing countries, endemic regions such as Latin America, Asia and Africa.[2] It is common cause of neurological disease occurs through the ingestion of parasite- Taenia solium (eggs), commonly from contaminated food or water or undercooked pork.[3] The parasite's lifecycle includes humans as definitive hosts and pigs as intermediate hosts. Humans harbour adult tapeworm in their intestines, while pigs host the larval stages. Infected humans shed eggs in faeces, contaminating the environment Tape worm which can grow upto 7 meters, release eggs within proglottids that contain 50,000-1,00,000 eggs. These eggs may be consumed by pigs and in pigs, the eggs hatch into larvae (cysticerci), which penetrate the intestinal wall and spread via bloodstream to various tissues. Humans acquire cysticerci by consuming undercooked pork. Once inside the body,

Figure 1. Magnetic resonance imaging in NCC: Images (a) (b) (c) (d): Shows well defined congulomerated ring enhancing lesion in right parieto-occipital region with mild to moderate perifocal oedema.



Address for Correspondance: Ramchandra Babar, Department of Paediatrics, MAM's SSAM's Sane Guruji Hospital, Malwadi, Hadapsar, Pune 411028.
Email: ramchandrababar@gmail.com

Table 1. Categories of diagnostic criteria of NCC.[8]

Serological tests	Findings
Absolute	1. Histological confirmation of the parasite in biopsy of a brain or spinal cord lesion. 2. Identification of a cystic scolex on CT or MRI. 3. Direct visualisation of subretinal parasites during fundoscopic examination.
Major	1. Neuroimaging findings highly suggestive of NCC. 2. Positive serum EITB Enzyme-Linked Immunoelectrotransfer blot for anti-cysticercus antibodies. 3. Resolution of intracranial cystic lesions following treatment with albendazole or praziquantel. 4. Spontaneous resolution of a small, single enhancing lesion.
EBV viral capsid antigen	1. Neuroimaging findings consistent with NCC. 2. Clinical symptoms indicative of NCC. 3. Positive CSF ELISA for anti-cysticercus antibodies or antigens. 4. Evidence of cysticercosis outside the CNS.
Epidemiological	1. History of household contact with Taenia solium infection. 2. Individuals coming from or living in the area endemic for cysticercosis. 3. History of frequent travel to areas where cysticercosis is endemic. 4. Diagnostic certainty.
Definitive	1. Presence of at least one absolute criterion. 2. Presence of two major criteria, one minor criteria and one epidemiological criterion.
Probable	1. Presence of one major criteria and one minor criteria. 2. Presence of one major criteria, one minor and one epidemiological criterion. 3. Presence of three minor criteria and one epidemiological criterion.

larvae can travel to the brain, causing neurological symptoms.[4] Cysticerci infection of tissues of the central nervous system causes NCC.[5] Differential Diagnoses was Tuberculoma, Brain abscess, Metastasis, Glioma. Radiological imaging plays a confirmative role in diagnosing NCC. In this case dietary history gives a clue for diagnosis and further investigation. Common findings on CT scans include dystrophic calcifications, while MRI with contrast reveals cystic lesions with a scolex [Figure 1 (a), (b), (c), (d)], a characteristic feature of NCC. MR spectroscopy helped to differentiate NCC from other lesions by showing elevated choline levels. Definitive diagnosis (Table 1) requires either histological confirmation, imaging of a scolex, or visualization of sub retinal parasites on fundoscopy.[8] In this case, MRI Brain showed multi-lobulated cystic lesion in the posteromedial left temporal/occipital region. Further MRI imaging with contrast identified a nodular, ring-enhancing lesion approximately 10 mm in size in the right parieto-occipital subpial cortex, accompanied by mild to moderate perifocal edema. These findings raised suspicion of neurocysticercosis (NCC) or tuberculoma. To confirm diagnosis MR Spectroscopy was done showed mildly elevated choline levels and slightly reduced N- acetylaspartate (NAA). A choline/creatinine ratio of 1.3 (greater than 1) suggested an infective lesion in the right parietal lobe with cerebral oedema. Findings were more in favour of NCC.

The treatment of active NCC involves a combination of antiepileptic drugs, corticosteroids to reduce inflammation and antiparasitic therapy with albendazole (15 mg/kg/day) or praziquantel (50 mg/kg/day) for 2-4 weeks.6 In cases involving large cysts causing mass effects, hydrocephalus, or diagnostic uncertainty, surgical intervention may be required.7 The treatment of active NCC involves a combination of antiepileptic drugs, hence in our case on 1st day patient was started with levetiracetam (20 mg/kg loading followed by 10 g/kg/day) and clonazepam (0.25 mg/kg), 2nd on suspecting NCC Corticosteroid- Dexamethasone was started to reduce inflammation with antiparasitic therapy with albendazole (15 mg/kg/day) continued. A two-week course of oral albendazole, alongside antiepileptic therapy, was planned. The patient made a full recovery and was discharged in stable condition. Neurocysticercosis (NCC) is a parasitic disease affecting the central nervous system, caused by the larval form of the pork tapeworm Taenia solium. It is a leading cause of epilepsy worldwide. Early diagnosis is crucial for improving patient outcomes and ensuring effective management. This requires a thorough patient history, particularly concerning dietary habits and lifestyle. Neuro-imaging is essential for identifying lesions and scolex within cysts. MRI and MR spectroscopy helped for the same. Preventive measures, such as promoting public sanitation and hygiene awareness, are essential to reduce the incidence of NCC. Many active forms of NCC can be successfully treated with medical therapy.

Key Takeaways:

1. Timely Diagnosis: Combining imaging findings with a detailed history is crucial.
2. Comprehensive Management: Therapy includes antiparasitics, supportive care and symptom control.
3. Prevention Focus: Public education on hygiene and safe cooking practices can prevent transmission.

Compliance with Ethical Standards

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Conflict of Interest : None

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