



Fourth Ventricle Neurocysticercosis - A case report

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Abstract

Neurocysticercosis (NCC) is the most common helminthic disease of the nervous system in humans and it is caused by the larvae of the pork tapeworm, *Taenia solium*. The existence of intraventricular cysts, cysts in the cerebral aqueduct or fourth ventricle, and the degree of inflammation and scarring induced by the infection are all risk factors for the development of hydrocephalus. We present a case of fourth ventricle NCC cyst with obstructive hydrocephalus underwent complete excision via telovelar approach.

Keywords

Fourth ventricle, Intraventricular neurocysticercosis, *Taenia solium*

Introduction

Neurocysticercosis (NCC) is a parasitic disease caused by the larval stage of *Taenia solium* and is the most frequent parasitic infestation of the central nervous system and found mainly in the developing world.[1] Two main forms of the disease are known: intraparenchymal and extraparenchymal. Extraparenchymal disease can be subdivided in intraventricular, subarachnoid and spinal forms.[2] Intraventricular involvement occurs in 7%–33% of cases, and the fourth ventricle is the most frequent site. Fourth intraventricular neurocysticercosis (IVNCC) can cause critical problems of acute hydrocephalus because of cerebrospinal fluid (CSF) pathway obstruction or mass effect on the brainstem.[3] Although medical management has been described, IVNCC is not always amenable to medical management and usually requires surgical intervention. The type of surgical intervention needed varies from emergency management with ventriculostomy to various elective procedures, such as shunt placement, traditional craniotomy, and cyst excision without or with endoscopic assisted and purely endoscopic approaches.

Case report

A 20 years old female presented with headache and vomiting for 1 month duration. The brain magnetic resonance imaging (MRI) with contrast revealed a well defined thin walled non enhancing cyst of size 7*19*10 mm containing eccentrically placed scolex like nodule is seen in inferior IV ventricle causing moderate dilatation of ventricular cisterns with diffuse effacement of basal cisterns and cerebral sulci suggestive of Neurocysticercosis inferior fourth ventricle causing obstructive hydrocephalus. The patient was placed in the prone position with the head supported by a three-point head holder. The fourth ventricle was accessed through a midline sub occipital craniotomy and telovelar approach. The cyst was identified and dissected from the ependyma, allowing for en bloc removal without rupture. The cerebrospinal fluid (CSF) flow was restored. We performed a watertight dural closure and titanium mesh cranioplasty. post operative period was uneventful. Histopathology suggestive of neurocysticercosis. The CSF analysis showed no cells and normal glucose and proteins' levels. patient was discharged in a stable condition with complete resolution of symptoms.

Discussion

NCC is the most common helminthic disease in the central nervous system and the most frequent preventable cause of epilepsy in the developing world.[4] It is caused by the larval form of the *T. solium*, commonly referred as the “pork tapeworm.” Human NCC most commonly occurs through the ingestion of food or water contaminated with *T. solium* eggs. Depending on the affected compartment, NCC may be classified as intraparenchymal or extraparenchymal and the latter subdivided in intraventricular, subarachnoid and spinal forms. Extraparenchymal NCC is associated with high mortality due to hydrocephalus, arachnoiditis, and ventriculitis resulting in a worse overall outcome.[5] Intraventricular cysts are most found in the fourth ventricle (43%–70%) followed by the lateral (11%–43%) and third (1%–29%) ventricles with a minority in the aqueduct (7%–9%). Hydrocephalus is frequently present in intraventricular NCC cases due to mechanical obstruction of CSF flow or associated arachnoiditis. Incidence peaks between the third and fourth decades. Del Brutto’s diagnostic criteria help identify NCC. Absolute criteria include histological characterization and cystic lesions with scolex on neuroimaging. In 12% of patients, the disease presents with hydrocephalus, caused by blockage of CSF flow through the ventricles, occlusion of foramina of Magendie and Luschka, or inflammatory reaction causing aqueduct stenosis. Differential diagnoses of intraventricular cystic lesions comprise infectious, neoplastic, and nonneoplastic cysts.[6] Infectious cysts other than neurocysticercosis include tuberculomas, pyogenic abscesses, hydatidosis, and toxoplasmosis.[7] Neoplasms that can present as cystic lesions in this location include ependymoma, subependymoma, and choroid plexus tumours.[8] Arachnoid cysts, Blake’s pouch cysts, ependymal cysts, and colloid cysts are well-known nonneoplastic/non-infectious cysts that can present in the fourth ventricle. Medical history and epidemiology can help to define the likelihood of a diagnosis. In this case, the presence of the scolex inside the cyst and the epidemiological context of the

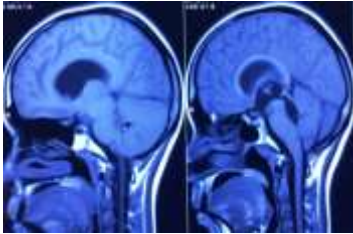
patient made NCC the first diagnostic hypothesis. Therapeutic approaches include surgery and medical treatment (corticosteroids and antihelminthics). We chose an open approach to remove the cyst, with a telovelar approach to the fourth ventricle with successful lesion removal. The medical treatment for intraventricular NCC remains controversial. Antihelminthics are recommended in parenchymal NCC but have no clear benefits in intraventricular NCC when surgery is feasible with intact cyst removal. Medical treatment for NCC remains controversial. In active intraparenchymal disease, anthelmintic medication has shown to prevent epilepsy and reduce the number of viable lesions.[9] The recent guidelines by the Infectious Diseases Society of America (IDSA) and the American Society of Tropical Medicine and Hygiene (ASTMH) recommend albendazole monotherapy (15 mg/kg/day divided into two daily doses) for 10–14 days in case of one or two active parenchymal cysticerci. When more than two viable lesions are present, a combined treatment with albendazole (15 mg/kg/day) and praziquantel (50 mg/kg/day) is preferred for the same period. However, anthelmintic medication has not shown major benefits for intraventricular NCC susceptible for surgical removal.[10] Some experts even recommend to not use them preoperatively, as it can result in disruption of parasite integrity and an inflammatory response that can prevent successful cyst removal. Steroids, as prednisolone or dexamethasone, are normally used to control the inflammatory process following degradation of viable cysts, to reduce brain edema in the perioperative period and as adjuncts to cysticidal therapy. In our case, at 6-month follow-up, the patient had no signs of disease recurrence and no anthelmintic medication had ever been used.

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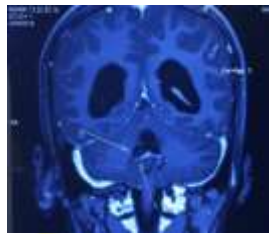
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1(a)



(b)



2



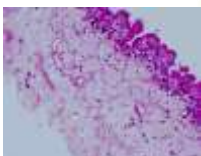
3(a)



(b)



4



1(a) MRI T1 sagittal image shows cyst with nodule seen in inferior fourth ventricle causing moderate dilatation of ventricular cisterns

1(b) MRI T1 contrast image shows a well defined thin walled non enhancing cyst containing eccentrically placed scolex like nodule seen in inferior fourth ventricle

2. Intra operative images shows cyst seen in fourth ventricle

3(a)(b) Neurocysticercosis excised specimen showing nodule

4. Histopathology of specimen showing the characteristic three layered wall: a cuticular layer with hair-like microtrichia, middle cellular layer, and an inner reticular layer with focal calcification