

Case of Intraventricular Neurocysticercosis; initially diagnosed as chronic migraine

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Abstract

The tapeworm cysts inside the cerebral ventricular system (Intra-ventricular Neurocysticercus) usually coexists with intra-parenchymal cyst. The case presented here is unique, as no intra-parenchymal cyst was visualized on CT scan. A provisional diagnosis of chronic migraine was made based on the clinical history and examination. Due to lack of response to migraine therapy MRI scan of head was performed which demonstrated a dilated ventricular system including lateral, third and fourth ventricle. An intraventricular cystic lesion was seen in fourth ventricle with an eccentric focus & the provisional diagnosis of intraventricular cysticercus was made. The patient was put on albendazole and dexamethasone for 8 days to which the patient responded. On regular follow up the patient was symptom free for 6 months after the completion of therapy.

Keywords: Intraventricular, Neurocysticercosis, MRI, Headache

Introduction

Intraventricular Neurocysticercosis (IVNCC), the presence of tapeworm cysts inside the cerebral ventricular system, occurs in approximately 15-20 % of patients with Neurocysticercosis (NCC).^[1,2,3] Intraventricular cysts are firmly encapsulated. They may circulate freely throughout the cerebrospinal fluid (CSF) pathways or become attached to the ependyma anywhere in the ventricles, but their predilection is for the occipital horn of the lateral ventricles and fourth ventricle.^[4] Intraventricular cysts may be single or multiple, and frequently coexist with multiple parenchymal and subarachnoid cysts.^[1,2,5] Seizures subsequently develop in many patients with intraventricular cysts because of the concomitant parenchymal cysts.^[5] Approximately 30% of all patients with NCC develop hydrocephalus due to CSF obstruction by intraventricular or subarachnoid lesion.^[6] The larvae prefer well-perfused parenchymal sites; the ventricles become populated with cysts when the parenchyma is filled. A cyst in the fourth ventricle, however, tends to be solitary, without accompanying parenchymal cysts.^[7,8,9]

The diagnosis of IVNCC is based on clinical presentation, Magnetic Resonance Imaging (MRI) evidence of cystic lesions containing the scolex and isolating the parasite histologically from the brain lesions or the CSF.^[10] MRI is more sensitive than Computed Tomography (CT) for depicting cysts in the brain parenchyma, for identifying inflammation and involvement of the cerebral ventricles, cisterns or brain stem. However CT is the best method for detecting calcification associated with prior infection.^[11] Intraventricular cysts are isodense with CSF and hence not well imaged on CT. ^[12] MR imaging detects most ventricular cysts, because the scolex is better visualised than on CT and the signal properties of cystic fluid and CSF are somewhat different on T2 Weighted Image (T2 WI).^[13]

The case presented here is unique and scientifically relevant, as it emphasizes the importance of use of MRI as diagnostic modality of choice for intraventricular neurocysticercosis. Due to lack of visualization of intra parenchymal cysts on CT scan the diagnosis of neurocysticercosis was initially missed.

CASE REPORT

The patient is a 17 year old right handed female with chief complaint of headache (bilateral, dull aching type, non-radiating, worse on exertion, relieved on rest and taking analgesics) for the past one year. She was initially diagnosed of migraine and started on sumatriptan with no relief. There is no history of loss of consciousness, seizures, trauma, dental work or hypertension. The patient is non-vegetarian by diet with no relevant past medical history. The physical examination was unremarkable and the neurological examination was intact. Non Contrast CT and subsequent Contrast Enhanced CT showed no parenchymal lesion.

After prolonged course of migraine therapy with no response, MRI scan was done on AIRIS, Hitachi, Japan. Both Spin Echo and TSE sequences with T1 and T2 W images in axial, sagittal and coronal planes were done and were compared with post Gadopentolate dimelglumine (GD-DTP) T1 images in axial, sagittal and coronal planes. MRI demonstrated a dilated ventricular system including lateral, third and fourth ventricle. An intraventricular cystic lesion was seen in fourth ventricle with an eccentric focus. A provisional diagnosis of intraventricular cysticercus (in the fourth ventricle) was made and the patient was put on albendazole and dexamethasone for 8 days. Patient responded to medical therapy and was symptom free for 6 months after the cessation of therapy.

Discussion

Neurocysticercosis is typically first seen with seizures (70% - 90% of acutely symptomatic patients) or headache.^[14,15,16,17,18] Headache usually indicates the presence of hydrocephalus, meningitis or increased intracranial pressure. The mortality rate of patients with hydrocephalus or increased intracranial pressure is higher than the mortality rate of patients with seizures.^[19] Other neurological manifestations include pyramidal tract signs, sensory deficits, involuntary movements and cerebellar ataxia. Generally patients with neurocysticercosis have partial-onset seizures with or without secondary generalization.^[20] Cysts that are active and undergoing degeneration (colloidal cysts) are the most epileptogenic.

Differential Diagnosis

The differential diagnosis of IV NCC includes toxoplasmosis, fungal and bacterial meningitis, hydrocephalic sequelae of tuberculous meningitis, echinococcosis, intraventricular neoplasm, colloid cyst and non-infectious granulomatous chronic meningitis.^[8,21,22,23]

In the brain parenchyma the larva undergoes an orderly life cycle, from cysticercus to involution. These pathological stages can be correlated with progressive etiological appearance of the lesion.^[11] Larval tissue invasion phase is not normally imaged owing to lack of symptoms at this early stage, if imaged; it appears as a localized focus of edema on T2WI and nodular tissue enhancement following administration of Gadopentolate dimelglumine. This is followed by the vesicular stage, marked by formation of a thin walled cyst that encircles the scolex containing antigenically inert clear fluid with no surrounding inflammatory response. The fluid within the cyst parallels CSF in signal intensity and the scolex appears as a mural nodule that is isointense with the brain parenchyma. The patient is usually asymptomatic at this stage. Then parasite dies and the metabolic breakdown results in local inflammatory response. There is granulation tissue formation with breakdown of blood brain barrier, resulting in an avid ring enhancement. The fluid within the cyst transforms into a colloidal suspension containing protein solutes with T1 shortening. This stage is called as Colloidal stage. After this, degeneration of the cysticercus takes place (Nodular Granular stage). Perilesional edema begins to subside gradually; the cyst involutes and the contents begin to mineralize.

Gradually the granulomatous lesion shrinks and calcifies. CT shows a calcified nodule and MR images shows a hypointense nodule in all pulse sequences. This final stage of cysticercus is termed as Calcified stage.^[24]

MRI is currently the most useful imaging tool for NCC,^[25] and is superior to CT.^[25,26] It is especially useful for the assessment of intraventricular cystic lesions and is often diagnostic.^[25]

Disclosures

The authors report no conflicts of interest in this work.

References

1. Cuetter AC, Andrews RJ: Intraventricular neurocysticercosis, in Singh G, Prabhakar S (eds): *Taenia Solium Cysticercosis*. Oxford, UK: CABI Publishing, 2002, pp 199-210
2. Cuetter AC, Garcia-Bobadilla J, Guerra LG, et al: Neurocysticercosis: Focus on intraventricular disease. *Clin Infect Dis* 1997, 24: 157-164.
3. Madrazo I, Garcia-Renteria JA, Sandoval M, et al: Intraventricular cysticercosis. *Neurosurgery* 1983, 12:148-152.
4. Botero D: Taeniasis, in Goldsmith R, Heyneman D (eds): *Tropical Medicine and Parasitology*. Norwalk, CT: Appleton & Lange, 1989, pp 490-500
5. Lobato RD, Lamas E, Portillo JM, et al: Hydrocephalus in cerebral cysticercosis. Pathogenic and therapeutic considerations. *J Neurosurg* 1981, 55:786-793.
6. Salazar A, Sotelo J, Martinez H, et al: Differential diagnosis between ventriculitis and fourth ventricle cyst in neurocysticercosis. *J Neurosurg* 1983, 59:660-663.
7. Bandres JC, White AC Jr, Samo T, et al: Extraparenchymal neurocysticercosis: report of five cases and review of management. *Clin Infect Dis* 1992, 15:799-811.
8. Couldwell WT, Chandrasoma P, Apuzzo MLJ, et al: Third ventricular cysticercal cyst mimicking a colloid cyst: case report. *Neurosurgery* 1995, 37:1200-1203.
9. Zee CS, Go JL, Kim PE, et al: Imaging of neurocysticercosis. *Neuroimaging Clin N Am* 2000, 10:391-407.
10. Del Brutto OH, Rajshekhar V, White AC Jr, et al: Proposed diagnostic criteria for neurocysticercosis. *Neurology* 2001, 57:177-183.
11. S khandelwal, P Sakhi, GL Sharma, UD Saxena: Intraventricular cysticercosis *IND J RADIOL IMAG* 2002 12:3:329-332
12. Madarazo I, renteria JA, paredes G,et al: Daigosis of intraventricular and cisternal cysticercosis by computerised tomography with positive intraventricular contrast medium. *J Neurosurgery* 1981, 55 : 947-951.

13. Ginier BL, Poirier V: MR Imaging of Intraventricular Cysticercosis. *AJNR Am J Neuroradiol* 1992, 13: 1247-1248.
14. Roman, G; Sotelo, J; Del Brutto, O; Flisser, A; Dumas, M; Wadia, N, et al. A proposal to declare neurocysticercosis an international reportable disease. *Bull WHO*. 2000; 78:399–406.
15. Medina, MT; DeGiorgio, C. Introduction to neurocysticercosis: A worldwide epidemic. *Neurosurg Focus*. 2002;12:6.
16. Sanchez, AL; Lindback; Schantz, PM; Sone, M; Sakai, H; Medina, MT; Lunstrom, I. A population-based, case-control study of *Taenia solium* taeniosis and cysticercosis. *Ann Trop Med Parasitol*. 1999;93:247–258.
17. Del Brutto, OH; Santibanez, R; Noboa, CA; Aguirre, R; Diaz, E; Alarcon, TA. Epilepsy due to neurocysticercosis: Analysis of 203 patients. *Neurology*. 1992; 42:389–392.
18. Carpio, A. Neurocysticercosis: An update. *Lancet Infect Dis*. 2002; 2:751–762.
19. DeGiorgio, CM; Houston, I; Oviedo, S; Sorvillo, F. Death associated with cysticercosis: Report of three cases and review of the literature. *Neurosurg Focus*. 2002; 12:1–4.
20. Medina, MT; Rosas, E; Rubio-Donnadieu, F; Sotelo, J. Neurocysticercosis as the main cause of late-onset epilepsy in Mexico. *Arch Intern Med*. 1990; 150:325–327.
21. Alarcon F, Duenas G, Moncayo J, et al: Neurocysticercosis. *Neurology* 1991, 41:462–463.
22. de Moraes-Rego SF, Latuf NL: Cisticercose do quarto ventrículo simulando neoplasia da fossa posterior à cintillografia cerebral. *Relato de um caso*. *Arq Neuropsiquiatr* 1978, 36:371-374.
23. Zee CS, Segall HD, Destian S, et al: MRI of intraventricular cysticercosis: surgical implications. *J Comput Assist Tomogr* 1993, 17:932-939.
24. He'ctor H. Garc'ia, Oscar H. Del Brutto. Imaging findings in neurocysticercosis. *Acta Tropica* 2003, 87: 71-78.
25. Ghosh D, Dubey TN, Prabhakar S. Brain parenchymal, subarachnoid racemose, and intraventricular cysticercosis in an Indian man. *Postgrad Med J* 1999;75:164-166.
26. Govindappa SS, Narayanan JP, Krishnamoorthy VM, et al. Improved detection of intraventricular cysticercal cysts with the use of three-dimensional constructive interference in steady state MR sequences. *Am J Neuroradiol* 2000; 21: 679-684.



Figure 1: Cyst appears iso-intense to intermediate signal intensity on T1 WI (SAG, CON), with marked dilation of the ventricular system.



Figure 2: Cyst appears hyperintense on T2 WI (COR), with dilation of ventricles.

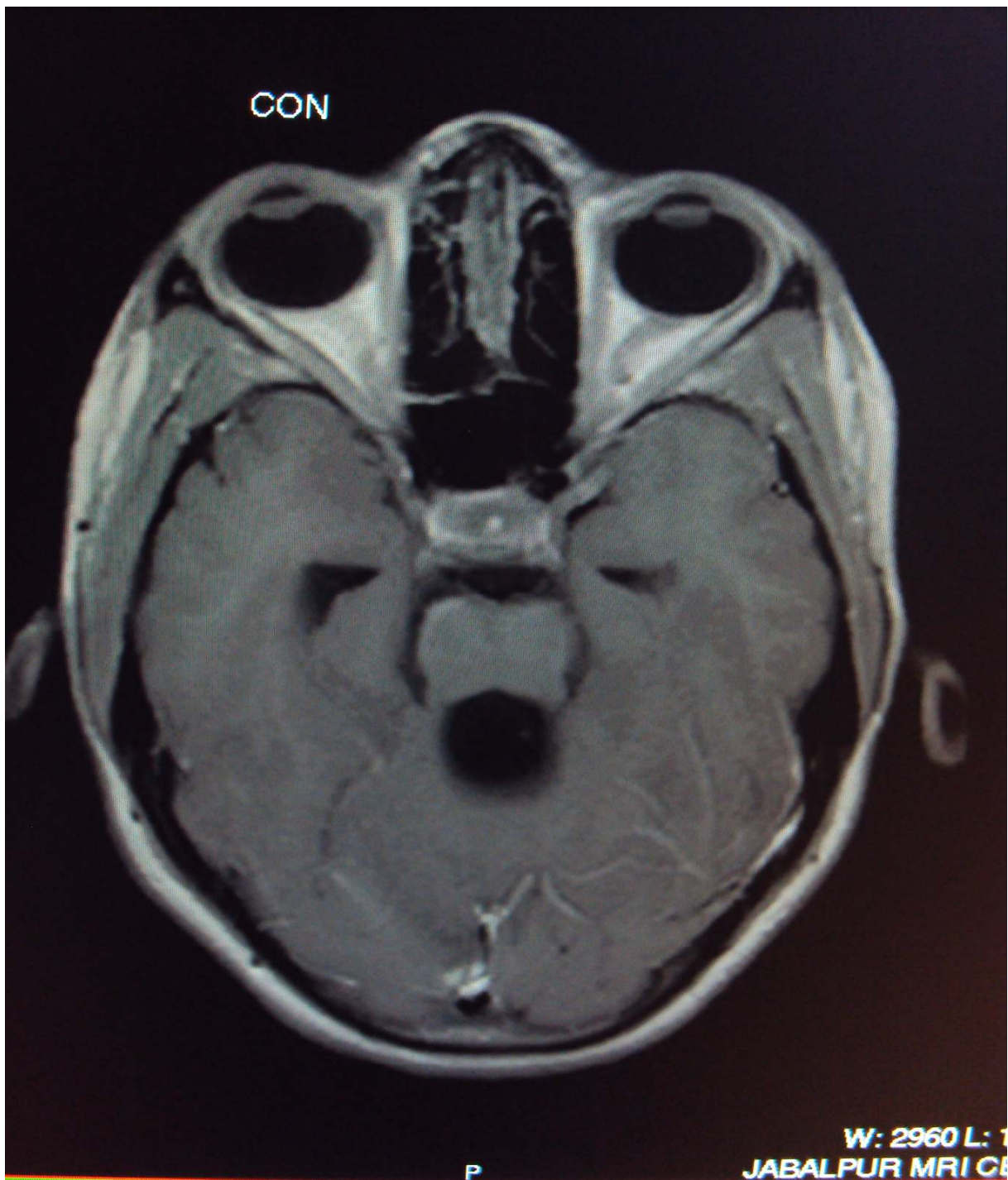


Figure 3: Axial T1 WI showing iso intense to intermediate intensity cyst with dilated 4th ventricle.