

Case Report

Intraventricular migration of an isolated fourth ventricular cysticercus following cerebrospinal fluid shunting

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Abstract

Background: Isolated intraventricular neurocysticercosis (NCC) is less frequently seen and can be missed on plain magnetic resonance imaging (MRI). Three-dimensional constructive interference in steady state (CISS) sequence is an extremely helpful sequence in identifying the lesion but is rarely used routinely.

Case Description: Here, we report a case of young male adult who presented with diminution of vision and headache. MRI of the brain revealed hydrocephalus, and on using CISS sequence only, the lesion could be identified in the fourth ventricle. He was treated with medical management, and ventriculoperitoneal shunting of cerebrospinal fluid was done to relieve the hydrocephalus. It resulted in immediate relief with aggravation of headache few days later. Repeat MRI revealed intraventricular migration into the left foramen of monro leading to left lateral ventricle dilatation necessitating endoscopic removal of the lesion.

Conclusion: CISS sequence is definitely the sequence of choice in identifying intraventricular NCC. Ventriculoperitoneal shunting can result in the intraventricular migration of the cyst due to sudden decompression necessitating repeat surgery. Endoscopic removal of NCC has a high success rate with limited complications.

Key Words: CISS sequence, endoscopic, intraventricular, migration, neurocysticercosis, VP shunting

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Quick Response Code:**INTRODUCTION**

Neurocysticercosis (NCC) is caused by an infection of the central nervous system (CNS) by the larval stage of the pork tapeworm *Taenia solium*. It is endemic in India and is prevalent in other developing nations, with increasing incidence in developed countries due to globalization.^[5] Magnetic resonance imaging (MRI) is superior to computed tomography (CT) to diagnose the ventricular form, which is suspected on the basis of mass effect, ventricular obstruction, presence of a cyst rim, or cerebrospinal flow (CSF) flow void adjacent to the cysts.^[15] Intraventricular migration of NCC has been considered to be a potential complication of shunt

surgery,^[2,3,13] however, to the best of our knowledge, previously only one case report has been published in the English literature reporting it as a complication of ventriculoperitoneal shunting.^[13] Endoscopic removal

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of intraventricular NCC is the current standard of care.^[1,4,8,12]

CASE REPORT

A 17-year-old male patient presented to the ophthalmology outpatient department with complaints of headache and diminution of vision for the last 20 days. There was no history of fever or trauma. There were no signs of meningeal irritation. The vitals were within normal limit. The clinical evaluation revealed relative afferent pupillary defect in the left eye with evidence of bilateral papilledema on fundoscopy. The patient was advised MRI of the brain to rule out any cerebral pathology. MRI revealed communicating hydrocephalus with no evidence of any space occupying lesion. No lesion could be identified on plain MRI. The MRI was reviewed due to a high index of clinical suspicion, and the possibility of a very tiny nodule in the fourth ventricle was raised, which necessitated further imaging with with constructive interference in steady state (CISS) sequence [Figure 1]. A ring lesion with an eccentric scolex in the fourth ventricle with no evidence of post-contrast enhancement was seen. Thus, an imaging diagnosis of isolated fourth ventricular NCC was made. The patient was started on albendazole and ventriculoperitoneal shunting was done to alleviate hydrocephalus for symptomatic relief of the headache. There was immediate relief of the symptoms with recurrence of severe headache on the left side within few days. Repeat MRI with CISS sequence was done which showed an intraventricular cystic lesion in the 3rd ventricle which was extending through the foramen of monro into the frontal horn of the left lateral ventricle with dilated left lateral ventricle

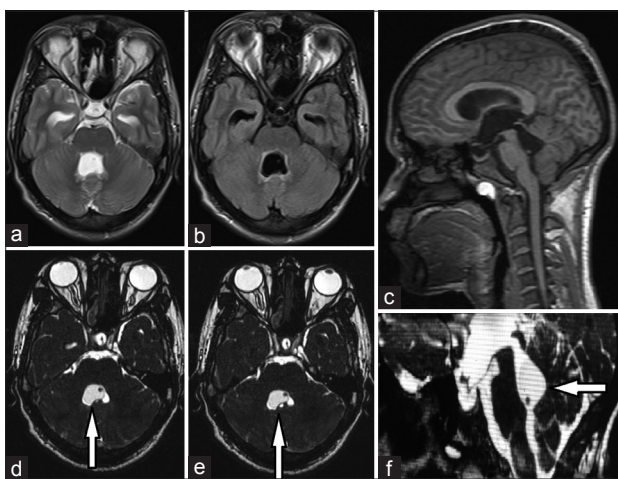


Figure 1: T2-weighted (a), fluid-attenuated inversion recovery (b) axial images, sagittal MP-RAGE (c) shows enlarged fourth ventricle with dilated temporal horns of bilateral lateral ventricle. There is no suspicion of any cystic lesion except for an appreciation of a dot which turns out to be scolex. The cystic lesion with eccentric scolex is easily appreciated on constructive interference in steady state sequence (d, e, f)

[Figure 2]. No lesion could be identified in the fourth ventricle suggesting intraventricular migration of the cyst. Ventriculoperitoneal shunt *in situ* was noted in right lateral ventricle, which was not dilated. The patient was referred to neurosurgery for endoscopic retrieval of the cyst. However, due to limited resource setting, the patient was referred to a higher centre for endoscopic removal of the lesion, which was uneventful. The patient is now doing well and was last seen at 3 months follow-up.

DISCUSSION

It is a disease of the young population with equal gender predilection.^[7] It is the most common cause of acquired seizures in young adults in endemic areas.^[14] The larvae of *Taenia solium* can affect any organ of the body but it is most commonly found in the CNS, eye, and muscles.^[7] Patients often present with recurrent seizures and features of raised intracranial pressure in the form of altered sensorium, visual loss, headache, vomiting, and papilledema.

This case is not only important from a diagnostic point of view but from the management perspective as well. While most common presentation is seizures noted in patients suffering from the parenchymal form, 20–30% of the patients can present with raised intracranial pressure and hydrocephalus, which is attributable to the intraventricular form.^[6] Recurrence of symptoms, especially headache after shunt surgery, should necessitate imaging to look for intraventricular migration. Usually the intraventricular form is more difficult to detect on CT scan than the parenchymal form because they appear as cystic lesions isoattenuating to the CSF. MRI is superior to CT in diagnosing the ventricular form, which is suspected on the basis of mass effect, ventricular

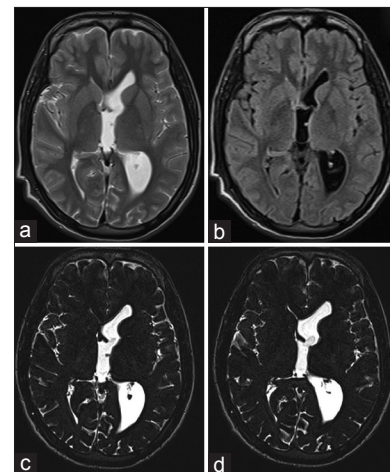


Figure 2: Post-shunt follow-up magnetic resonance imaging showing asymmetric enlargement of left lateral ventricle with a cystic lesion in left foramen of monro causing obstruction (a, b). The lesion with scolex is again better appreciated on constructive interference steady state sequence (c, d)

obstruction, presence of a cyst rim, or CSF flow void adjacent to the cysts.^[15] On MRI, the intraventricular lesions are more conspicuous because their signal characteristic differs slightly from that of the CSF on T2-weighted sequence. However, when the cyst has the same signal as the CSF, it can be difficult to detect on routine sequence. This is where three-dimensional CISS sequence scores over conventional MR sequences.^[9,11] Previously CT ventriculography has also been used to detect intraventricular NCC in cases where it could not be detected on CT or conventional MRI.^[10] In the present case, intraventricular NCC could be seen only on CISS sequence, which was added to assess unexplained hydrocephalus. Visualization of the eccentric scolex helps in differentiating from other intraventricular cysts and was also better appreciated on CISS sequence.

Apuzzo *et al.*,^[2] found that in many cases where ventriculostomy was indicated, permanent CSF diversion was not a requisite tactic in dealing with intraventricular disease to avoid future issues with cyst migration and eventual outlet obstruction. However, they did advocate surgical excision of simple cyst if radiographic or surgical evidence of arachnoiditis or ependymitis was absent. Kotha reported intraventricular migration of a 3rd ventricular cyst into lateral ventricle following ventriculostomy after an unsuccessful attempt was made to remove the lesion.^[13] The surgical intervention led to the sudden change of pressure differential across the foramen of monro resulting in migration. This is the best possible explanation for the present case as well. However, the migration in their case relived the obstructive hydrocephalus, whereas in the index case migration resulted in obstruction in left lateral ventricle. Hence, endoscopic removal was not needed and the patient was medically managed.^[13] Goel *et al.* published a series of 22 cases with successful endoscopic removal of intraventricular NCC with minimal significant complication.^[8] Citow *et al.* advised removal of intraventricular cyst (endoscopic or open) in cases of nonenhancing cyst wall. They reported that enhancing wall on MRI as a risk factor for residual hydrocephalus even after the removal of cyst.^[4]

CONCLUSION

Intraventricular NCC could be a cause for unexplained hydrocephalus. MRI with three dimensional-CISS sequence is definitely the imaging of choice in identifying intraventricular NCC. Sudden change of

pressure differential by the ventriculoperitoneal shunting could result in intraventricular migration of the cyst. Recurrence of symptoms or headache after shunt surgery in cases of intraventricular NCC should be viewed with suspicion for potential intraventricular migration. Endoscopic removal of NCC has a high success rate with limited complications.

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Conflicts of interest

There are no conflicts of interest.

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