Transventricular Migration of Neurocysticercosis

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Key words
- Intraventricular migration
- Neurocysticercosis
- Surgery

Abbreviations and Acronyms
CSF: Cerebrospinal fluid
MRI: Magnetic resonance imaging

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Citation: World Neurosurg. (2017) 105:1043.e11-1043.e13. http://dx.doi.org/10.1016/j.wneu.2017.07.003

Journal homepage: www.WORLDNEUROSURGERY.org

Available online: www.sciencedirect.com

BACKGROUND: **The movements of a neurocysticercosis cyst within the ventricular cavity have been identified rarely.**

CASE DESCRIPTION: **A 22-year old male patient presented with the main symptom of diplopia for about a week. Findings of the neurologic examination revealed bilateral sixth cranial nerve weakness. Investigations during the period showed an intraventricular tumor that migrated from lateral ventricle to the third ventricle and subsequently to the fourth ventricle. The lesion was resected from the fourth ventricle and was identified to be a neurocysticercosis cyst.**

CONCLUSIONS: **Such an intraventricular migration of any kind of tumor has not been recorded in the literature.**

INTRODUCTION

Movements of a tumor within the ventricular compartment have been described. Such a feature generally has been identified in pedunculated tumors such as choroid plexus papillomas.[1] The movements of a neurocysticercosis cyst within the ventricular cavity have been identified rarely.[2,3] We present a hitherto unreported sequence of migration of cysticercus cyst from lateral to third ventricle and then to the fourth ventricle.

CASE REPORT

A 22-year-old man, manual laborer by occupation, had headaches and vomiting for a 1-week period. When admitted, he was restless and irritable, had irrelevant verbalization, and was not cooperative for the neurologic assessment. He obeyed simple commands but could not be involved in any kind of discussion on most occasions. There was no obvious focal neurologic deficit. There was no papilledema.

Computed tomography performed at the time of admission showed a cystic lesion in the right lateral ventricle at the level of the foramen of Monroe (Figure 1A). There was enlargement of both lateral ventricles, right being larger than the left. As the patient was otherwise stable and had improvement in sensorium, it was decided to perform magnetic resonance imaging (MRI) before embarking on surgery to treat the cyst.

On the third day after admission, the patient developed sudden-onset bilateral sixth nerve paresis with upward gaze restriction. MRI performed at this stage showed that the lesion in the right lateral ventricle was no longer visible and there was a lesion in the third ventricle that had characteristic features of a neurocysticercal cyst (Figure 1B). While performing further MRI sequences, the lesion in the third ventricle could not be visualized and was seen in the fourth ventricle just above the foramen of Magendie (Figure 1C), There was no evidence of any other cyst in the brain, muscles, or in the rest of the body.

To prevent further migration of the cyst, the patient was operated on urgently in a sitting surgical position. A midline suboccipital craniotomy was performed. On opening the dura, the brain was found to be tense. By working between the 2 tonsils, we exposed the region of the fourth ventricle. A glistening cystic tumor with a greenish hue was visualized sitting at the foramen of Magendie. The cyst wall was held gently. Gentle traction on the cyst wall resulted in delivery of the entire cyst in a manner that mimicked the delivery of placenta from the womb of a mother. The entire cyst was removed in toto without rupture of its wall and spilling of its contents.

After the removal of the cyst, there was a free flow of cerebrospinal fluid (CSF) from the fourth ventricle into the surgical field. The floor of the fourth ventricle and the aqueduct were visualized vividly. The patient recovered well after surgery (Figure 2). Histologic examination of the specimen showed the characteristic cysticercal cyst without any evidence of inflammation. The patient was placed on albendazole. At 9-months follow-up, his bilateral sixth nerve weakness had resolved completely.

DISCUSSION

Migration of benign pedunculated tumors such as choroid plexus papilloma has been recorded twice previously.[1] We recently reported a case with intraventricular choroid plexus papilloma that probably migrated after a ventricular CSF diversionary shunt surgery.[3] The head posture of the patient and a freely floating profile of a choroid plexus papilloma could be responsible for such a tumor migration. Such a positional change of an intraventricular tumor could be labeled as mobility of the tumor over its peduncle

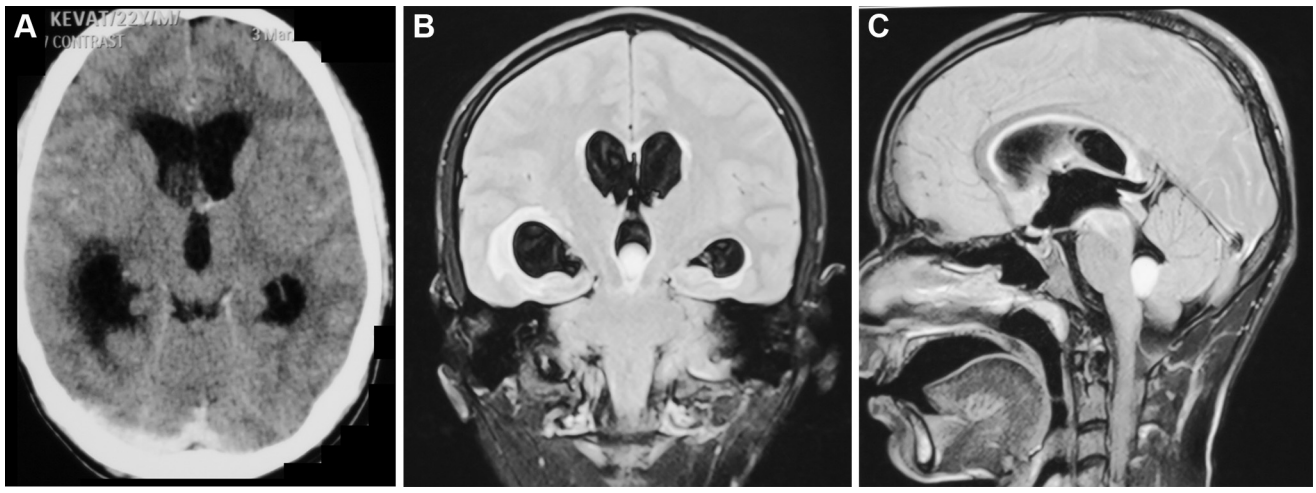

Figure 1. Images of a 22-year-old man. (**A**) Computed tomography scan showing the neuricysticercal cyst in the frontal horn of the right lateral ventricle obstructing the Foramen of Monroe. (**B**) Coronal fluid-attenuated inversion recovery magnetic resonance imaging (MRI) sequence showing the T2 hyperintense lesion in the posterior third ventricle just above the aqueduct of Sylvius. (**C**) T1-weighted sagittal image of MRI showing the migrated cyst in the fourth ventricle.

rather than its true migration as was identified in our case.

Central nervous system neurocysticercosis usually presents as parenchymal cystic lesions, presenting more often with symptom of epilepsy.[4] Intraventricular location of a cysticercal cyst is relatively rare but has been recorded. Such cysts have been identified in all the ventricular compartments, but the fourth ventricle is the most common location.[5-7] MRI shows the T1 and T2 hyperintense lesion clearly.[5] The identification of a scolex within the cyst is diagnostic. Constructive interference in steady state images of MRI have been useful to detect intraventricular cysts whose intensity is similar to CSF.[6]

Our departmental records isolated 5 additional cases of intraventricular cysticercal cysts, all located in the region of foramen of Magendie of the fourth ventricle. The very fact that all the cases identified in our database were located in the exit point of CSF in the region of fourth ventricle is suggestive that the cysticercal cyst sinks into the floor of CSF pool. Gravity and standing posture may have a role in such positioning of the cyst. As spinal MRI was not done in any of our cases, it was not possible to assess whether the standing human position resulted in slipping of the cyst and caudal migration from the fourth ventricle into the spinal canal.

The cysticercus cysts are characteristically smooth walled and slimy in nature and slip out of their confines rather easily during surgery. Although not identified previously, such a character of the cysts also permits their movements within the ventricular confines. The encysted parasite exhibits extreme plastic deformation and mobility, which allows its movement through very narrow canals. This movement has been observed physically and described in ocular cysticercosis. This

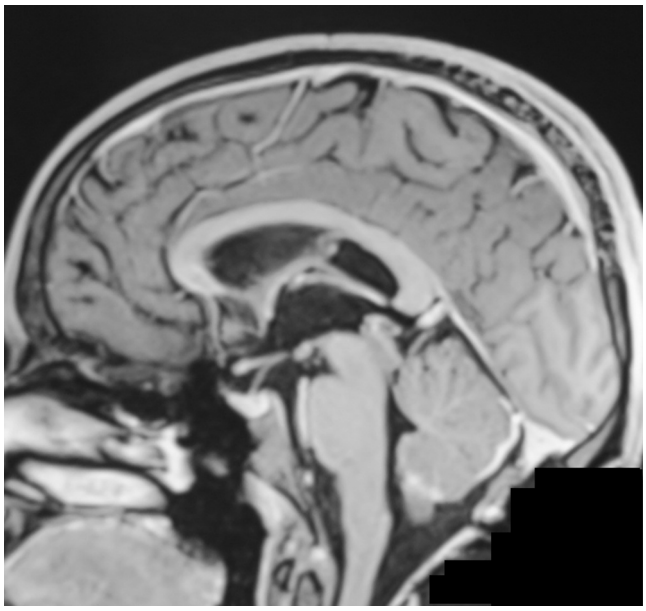

Figure 2. Postoperative image showing excision of the cyst.

malleability of the intraventricular neurocysticercal cyst can lead to intermittent or short-lived signs and symptoms of hydrocephalus due to movement causing blockage of the ventricular system with spontaneous relief of symptoms due to further passage and relief of obstruction of the CSF pathways. Cysticercosis, a supreme parasite, may remain undetected, even on imaging, and "nonreactive" and "plastic" until damage to the cyst wall and parasite, or death. This process then causes an inflammatory reaction by the host to the toxic chemicals released from the endopore and this, together with the loss of plasticity will diminish mobility. Under these circumstances there can be a "fixed" or rigid obstruction to CSF pathways or a meningitic reaction and arachnoiditis.

Thomas and Krishnamoorthy[3] have reported a case of migration of an intraventricular neurocyticercal cyst during MRI. The cyst moved from the temporal horn to the occipital horn of the lateral ventricle and was assumed to be gravity assisted. Khalid et al.[6] reported a case of fourth ventricular neurocysticercosis that initially was treated with ventriculoperitoneal shunting and albendazole. However, a repeat MRI showed that the cyst had migrated from the fourth ventricle in to the region of the foramen of Monroe and resulted in unilateral ventricular dilatation. The patient was then operated and an endoscopic excision of the cyst was performed. The authors speculated that the change of pressure differential after the shunting procedure caused the migration of the cyst. Kotha[2] reported migration of a third ventricular neurocysticercal cyst to the lateral ventricle following ventriculostomy by a similar mechanism. The cyst in the presented case was freely mobile within the ventricular system. Its traverse through the aqueduct was probably the cause of the bilateral sixth nerve weakness.

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Received 20 May 2017; accepted 5 July 2017

Citation: World Neurosurg. (2017) 105:1043.e11-1043.e13.
http://dx.doi.org/10.1016/j.wneu.2017.07.003

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