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Case Report

Giant cerebellar neurocysticercosis masquerading a primary central nervous system neoplasm – A case report with review of literature

Kavindra Singh[1], Rahul Singh[1], Rakesh K. Sihag[2], Arvind Kumar[2]

Departments of [1]Neurosurgery, [2]Pathology and Laboratory Medicine, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India.

E-mail: *Kavindra Singh - singh.kavindra8@gmail.com; Rahul Singh - poonia_cardiacsurgeon@yahoo.com; Rakesh K. Sihag - drrakeshsihag@gmail.com; Arvind Kumar - drarvindkumar10@gmail.com

***Corresponding author:**
Kavindra Singh,
Department of Neurosurgery,
All India Institute of
Medical Sciences, Rishikesh,
Uttarakhand, India.

singh.kavindra8@gmail.com

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ABSTRACT

Background: Neurocysticercosis (NCC) is one of the leading parasitic infections of the brain. Giant NCC is rare, with only two cases of cerebellar involvement reported till now. In the presence of a host immune response, these giant NCCs can mimic primary central nervous system neoplasms. The objective of this article is to report a rare case of giant cerebellar NCC and its management strategy with a literature review.

Case Description: A young male presented with a giant cerebellar ring-enhancing mass with features of raised intracranial pressure, and surgical excision was done. The patient made an uneventful recovery.

Conclusion: Surgical excision is safe for NCC, especially in the presence of a diagnostic dilemma.

Keywords: Central nervous system neoplasms, Colloidal vesicular, Neurocysticercosis, Ring-enhancing lesion

INTRODUCTION

Neurocysticercosis (NCC) is a parasitic infection of the brain caused by the larval forms of the cestode *Taenia solium*. It is a common cause of new-onset seizures in the adult population.[6] The clinical presentation can range from seizures, headaches, or focal neurological deficits. Contrast-enhanced magnetic resonance imaging (CEMRI) of the brain remains the imaging of choice, with the presence of an eccentric dot representing scolex clinching the diagnosis. Large NCC (>20 mm) is a rare finding, and in the presence of host response, it can lead to significant mass effect and difficulty in differentiating it from a primary central nervous system (CNS) neoplasm on radiology alone. Only a handful of cases of giant NCC mimicking CNS neoplasms have been reported in literature till now.[4,5,7,10]

CASE REPORT

A 32-year-old gentleman came to our outpatient clinic with complaints of holocranial headache of increasing severity for the past 2 months, along with swaying while walking. Examination revealed positive cerebellar signs with no evidence of papilledema. On CEMRI brain, there was a 4.8 × 3.8 × 2.8 cm involving the left cerebellum, and it was hypointense on T1, hyperintense

on T2 along with ring-like contrast enhancement with the presence of perilesional edema in the form of fluid-attenuated inversion recovery (FLAIR) hyperintensities adjacent to the lesion [Figures 1 and 2]. In view of features suggestive of raised intracranial pressure (ICP), he was taken up for surgery, and the tumor was accessed through a left retrosigmoid route. A large whitish yellow cyst, which was filled with fluid, was removed in toto [Figure 3]. The cyst was having a thin capsule with a well defined plane of cleavage from the surrounding cerebellum.

Pathological examination revealed a cyst wall with 3 layers [Figure 4]. Overall features were compatible with a diagnosis of NCC. The postoperative course of the patient was uneventful, and he was given a 2-week course of albendazole along with a tapering dose of steroids. Serologic testing for NCC was negative.

DISCUSSION

The first reported case of NCC dates back to 1558 when Rumler noticed fluid-filled vesicles adherent to the meninges while performing an autopsy of a patient with epilepsy.[2] Panarolus, in 1652, noticed similar vesicles in the corpus callosum of a priest who had suffered from seizures.[2] NCC is caused by the larval form of the tapeworm, which crosses the intestinal mucosa and gets dislodged in organs with high blood flow, such as the liver, brain, and muscle.

NCC includes a spectrum of diseases that differ in pathogenesis and clinical features.[12] The two forms include as follows:

Parenchymal NCC

- Nonviable calcified
- Single small enhancing lesion
- Viable parenchymal

Extraparenchymal NCC

- Intraventricular
- Subarachnoid
- Spinal

Imaging plays an important role in the diagnosis of NCC. The characteristic imaging findings of NCC in various

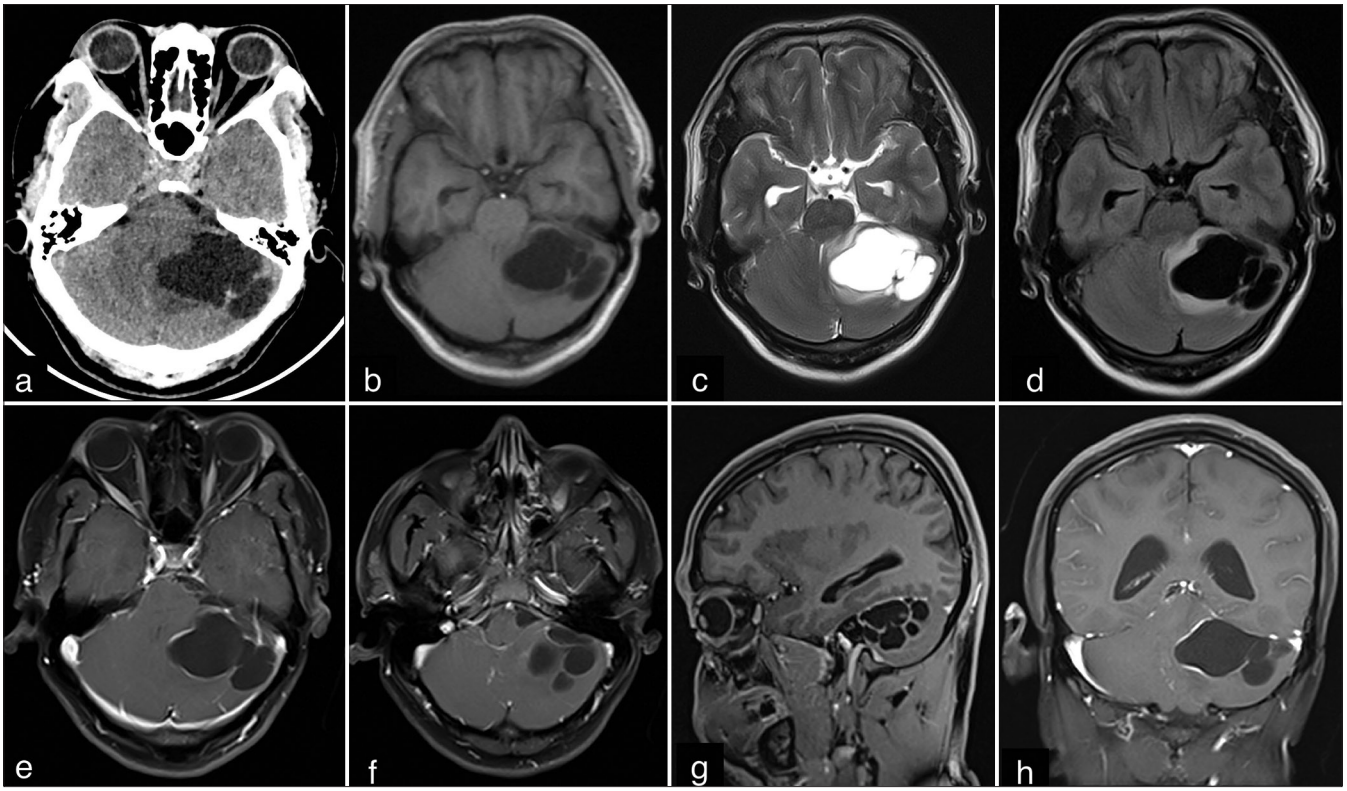

Figure 1: (a) Noncontrast computed tomography head showing a hypodense lesion in left cerebellum, (b-d) Axial magnetic resonance imaging (MRI) T1-weighted sequence showing a hypointense lesion involving left cerebellar hemisphere with hyperintense signal on T2-weighted sequences matching that of cerebrospinal fluid along with a fluid-attenuated inversion recovery hypointensity with surrounding hyperintense signal suggestive of perilesional edema, (e and f) Axial T1-weighted image with contrast sequences, (g) Sagittal and (h) coronal T1-weighted sequences with contrast depicting a ring enhancing lesion in the left cerebellum.

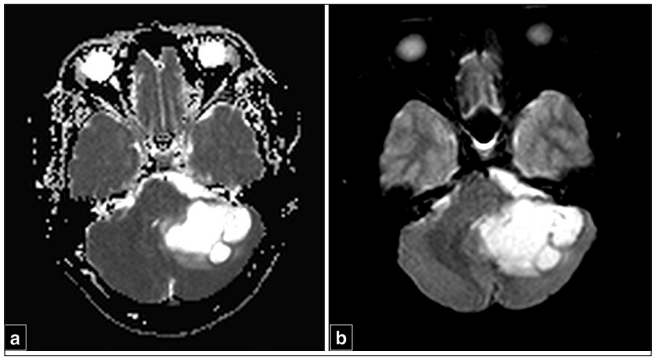

Figure 2: (a) Axial apparent diffusion coefficient magnetic resonance imaging (MRI) sequence and (b) axial TRACE diffusion-weighted MRI sequence showing bright signal on both suggestive of no restriction of diffusion in the lesion.

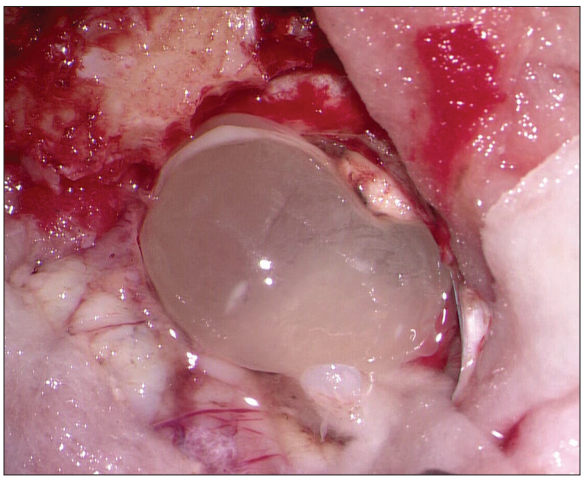

Figure 3: Intraoperative photograph showing intact cyst being removed.

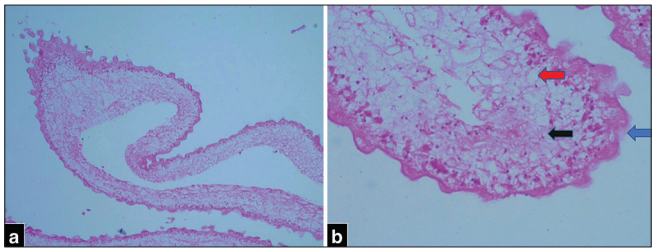

Figure 4: (a and b) Outer cuticle layer shows a convoluted pattern (Blue arrow), middle nuclear layer (Red arrow), and inner loose fibro collagenous parenchymal layer (Black arrow) (Hematoxylin & Eosin stain [H&E], ×200, ×400).

stages have been described in great detail.[3] In the colloidal stage of NCC, the parasite starts degenerating, leading to an inflammatory process. The cyst wall gets thickened, and the cyst fluid turns turbid. This leads to a hyperintense signal of the cyst and surrounding edema on T2-weighted sequences, along with iso to hypointense signal of the cyst wall. There is a ring-shaped contrast enhancement seen on T1 with contrast sequences. For a ring enhancing lesion, as in our case, the possible imaging differentials include pilocytic astrocytoma, hemangioblastoma, cerebellar metastasis, and NCC. Other magnetic resonance imaging characteristics of NCC include a higher apparent diffusion coefficient value due to lower cellularity, protein content, and viscosity associated with cysticercus cysts and lower relative cerebral blood volume in the contrast enhancing lesion compared to the normal brain. Decreased levels of choline (Cho), creatine (Cr), N-acetyl-L-aspartate (NAA), NAA/Cr, and Cho/Cr, along with increased levels of lipid and lactate are characteristic magnetic resonance spectroscopic findings of NCC. Advanced imaging, such as proton spectroscopy can also be helpful in cases with dilemma by showing a characteristic resonance of Suc in cases with NCC.[3]

The diagnosis of NCC is mostly based on imaging alone and serologic tests such as enzyme-linked immunotransfer blot or enzyme-linked immunosorbent assay are done to confirm the diagnosis once suspected on imaging.[3] Although fairly easy to diagnose on imaging, there have been instances of a diagnostic dilemma where the lesion was actually mimicking primary CNS neoplasms [Table 1].

Sabel *et al.*, in 2001, first reported a case of a 47-year-old male with a short history of speech difficulties.[7] Imaging revealed a multilobulated cystic frontal lobe mass with peripheral ring enhancement and surrounding edema. The imaging differential was a malignant brain tumor. Similarly, Bouillot *et al.*[1] reported two cases of NCC mimicking a brain tumor in 2003.[4] Umredkar *et al.*, in 2009, reported 2 cases where patients presented with altered mental status with radiologic evidence of a ring-enhancing cystic lesion causing uncal herniation and midline shift.[10] The surgical outcome in both cases was favorable. Similar cases of NCC mimicking a CNS neoplasm were reported by other authors as well.[5,8,9]

A common link in all the reported and present cases is the presence of a large parenchymal NCC (>20 mm) with peripheral ring contrast enhancement and perilesional edema and mass effect. Most of the reported cases, along with the current case, belong to the colloidal vesicular stage of pathological staging, where a host reaction will lead to the formation of a pseudocapsule, which can take contrast enhancement in the form of a ring, hence mimicking intrinsic CNS neoplasms such as cystic glioma.

To our knowledge, a large NCC (>2 cm) presenting in the infratentorial compartment has never been reported in the literature. This is the first report of a giant cerebellar NCC presenting with mass effect. Advanced imaging modalities such as spectroscopy can be of some help, but in cases of raised ICP features along with a diagnostic dilemma, surgery can be done with favorable outcomes, as is evident from the above table. Medical management, including antihelminthic

Table 1: List of cases where NCC was mimicking brain tumor.

Author	No. of patient	Location	Clinical present	MRI characteristics	Stage of disease	Outcome
Sabel *et al.*[7] (2001)	1	Frontal Lobe	Raised ICP, Speech difficulty	T1-Hypo T2-Hyper T1+C-ring enhancement	Colloidal vesicular	Favorable
Bouillot[1] (2003)	2	Frontal Lobe	Seizure, Facial paralysis	NA	NA	Favorable
Kim *et al.*[4](2006)	1	Cerebellar hemisphere	Dizziness, Nausea, Ataxia	T1-Hypo T2-Hyper T1+C-ring enhancement	Colloidal vesicular	Favorable
Umredkar *et al.*[10] (2009)	2	Temporal and frontal lobe	Seizure and altered sensorium	T1-hypo T2-hyper T1+C-ring CE	Colloidal vesicular	Favorable
Kim *et al.*[5] (2010)	1	Cerebellum	Headache, Dizziness	T1- hypo T2- hyper T1+C- ring CE	Racemose cysticercosis	Favorable
Vučković[11] (2011)	1	Occipital lobe	Seizure, visual disturbance	T1-Hypo T2-Hyper T1+C-Ring enhancement	Colloidal vesicular	Favorable
Sevin *et al.*[8] (2016)	1	Parietal Lobe	Seizures	NA	NA	Favorable
Soejitno *et al.*[9] (2020)	1	Frontal lobe	Seizures	T1-Iso T2-Hyper T1+C-Homogenous CE	Colloidal vesicular	Favorable
Present case (2023)	1	Cerebellum	Gait ataxia	T1-Hypo T2-Hyper T1+C-Ring CE	Colloidal vesicular	Favorable

ICP: Intracranial pressure, NCC: Neurocysticercosis, NA: Not available, CE: Contrast enhancing

drugs along with a tapering dose of steroids, remains the mainstay of treatment in the majority of the cases.

CONCLUSION

NCC, a common parasitic infestation of CNS, can sometimes mimic CNS neoplasms, especially when large. Surgical excision in patients with raised ICP and having diagnostic dilemmas has shown favorable outcomes.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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