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| RESEARCH ARTICLE

When Cysts Seize the Brain: A Rare Presentation of Colloid Cyst with Seizure

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| ABSTRACT

Colloid cysts are rare intracranial tumors, accounting for approximately 2% of all primary brain tumors. Although histologically benign and often asymptomatic, they can occasionally lead to abrupt neurological deterioration and sudden death. We present the case of a 26-year-old man with a previously diagnosed colloid cyst who arrived at the emergency department unconscious after a night of severe headache and repeated vomiting. Despite prompt diagnosis and neurosurgical intervention, the patient's condition rapidly declined, and he passed away the following day. This case highlights the potentially fatal outcomes associated with colloid cysts, despite their benign histological characteristics. It emphasizes the urgent need for clearer, evidence-based guidelines to inform management decisions. Developing reliable risk stratification tools may help prevent similar catastrophic outcomes.

| KEYWORDS

"Colloid", "Seizures", "Neurosurgery"

| ARTICLE INFORMATION

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1. Introduction

Colloid cysts are benign lesions comprising less than 2% of all primary brain tumors. While they are often asymptomatic and discovered incidentally on imaging, they can occasionally present with intermittent headaches, commonly accompanied by nausea and vomiting. In rare instances, colloid cysts can cause acute neurological deterioration, potentially resulting in coma or sudden death, with reported mortality rates being notably high in such scenarios. In this report, we present the case of a 26-year-old man with a previously diagnosed colloid cyst who experienced sudden and fatal neurological deterioration. This case underscores the importance of early recognition and timely management of colloid cysts, highlighting the need for clinicians to maintain a high index of suspicion when young adults present with headaches and associated red flag symptoms.

2. Case Report

A 26-year-old indian male was brought unconscious in a decorticate posture by national ambulance following referral from a private hospital. According to the patient's cousin, the patient experienced a headache starting the previous night, accompanied by multiple episodes of vomiting. He was found unconscious the next morning around 10:00 AM, exhibiting jerky movements and frothing at the mouth. He was initially taken to a private hospital where he remained unconscious and unresponsive to stimuli. He was administered diazepam and subsequently transferred to Salmaniya Medical Complex. Further history obtained from relatives revealed that the patient had a history of frequent headaches during childhood and was diagnosed with a colloid cyst at the age of six years old. Since then, he had remained asymptomatic with no reported seizures, headaches, or neurological complaints. This episode represented his first acute neurological deterioration since the original diagnosis.

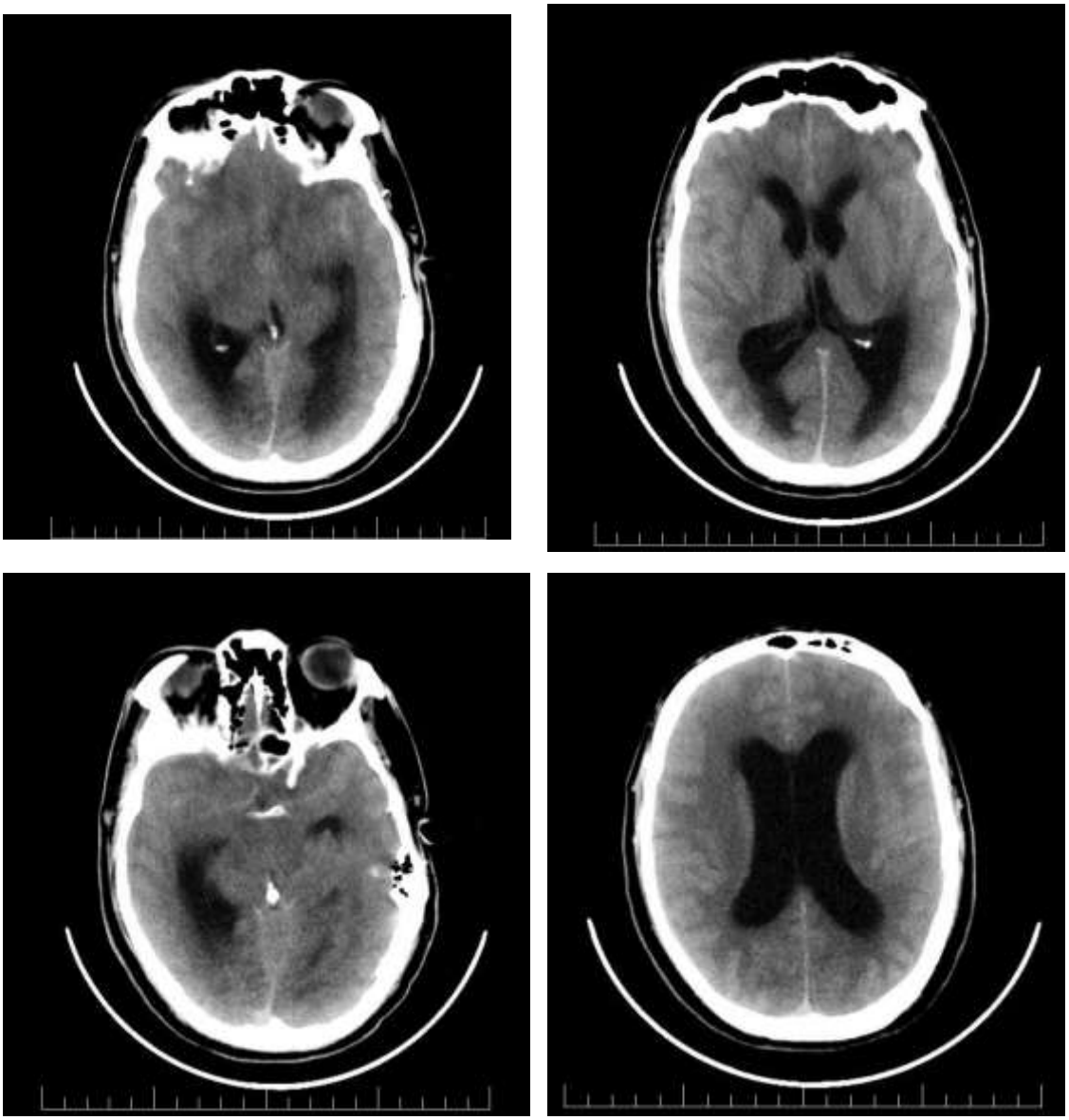
Vital signs revealed a heart rate of 88 beats per minute, blood pressure of 130/52 mmHg, temperature of 40°C, and oxygen saturation of 99% on 15 L of 100% oxygen through a non-rebreather face mask. It was noted that his respiration was rapid and shallow. On physical examination, the patient was unconscious and unresponsive to both verbal and painful stimuli, with a Glasgow Coma Scale (GCS) score of 4/15. Pupils were bilaterally fixed and dilated. Both corneal and gag reflexes were absent. The head showed no signs of trauma. The rest of the examination was unremarkable. Eventually, the patient was intubated and commenced on mechanical ventilation with a fraction of inspired oxygen (FiO_2) of 40% with continuous cardiac and oxygen saturation monitoring. Laboratory investigations are summarized in Table 1.

Table 1: Serum Laboratory Investigation on Presentation

Investigation	**Value**	**Interpretation**
White blood cell count	18.31 x 10^9/L	High
Neutrophils	87.70	High
Hemoglobin	15.70 g/dl	Normal
Glucose (random)	8.3 mmol/L	Normal
Sodium	138 mmol/L	Normal
Potassium	3.4 mmol/L	Low (hypokalemia)
Calcium	2.47 mmol/L	Normal
Inorganic phosphorus	0.2 mmol/L	Low
Magnesium	0.65 mmol/L	Low

Additionally, a toxicology panel was conducted, which revealed no evidence of drug or toxin exposure. Imaging included a CT brain and CT cerebral angiogram. The CT brain demonstrated diffuse cerebral edema with effacement of the supratentorial and infratentorial sulci and basal cisterns. Tonsillar herniation and complete effacement of the fourth ventricle were noted. The lateral ventricles were dilated, and a well-defined hyperdense lesion measuring approximately 1.4 × 1.45 × 1.5 cm was identified at the anterior third ventricle, consistent with a colloid cyst causing obstructive hydrocephalus **(Image 1).**

Image 1: The Computed Tomography Scan at the Time of Presentation



The neurosurgery team was consulted, and the patient received an intravenous bolus of 300 mL of 20% mannitol. He subsequently underwent bilateral external ventricular drain (EVD) insertion under general anesthesia.

On the second day, the patient remained sedated and on mechanical ventilation. Intracranial pressure (ICP) hourly monitoring showed persistently elevated readings at 24 mmH_2O. The patient continued to have a high-grade fever, and his serum sodium level was markedly elevated at 173 mmol/L. Neurological examination revealed preserved corneal reflexes and a cough response to suctioning. However, the pupils remained fixed and dilated, and there was no response to painful stimuli.

At 11:32 PM, the patient experienced a rapid clinical deterioration, progressing to asystole. Despite activation of a code blue and administration of high-quality cardiopulmonary resuscitation following ACLS protocols, the patient did not regain spontaneous circulation and was declared deceased at 11:48 pm.

3. Discussion

Colloid cysts are rare, benign intracranial lesions that account for less than 2% of all primary brain tumors. Over 99% are located at the anterior third ventricle near the foramen of Monro, where they can obstruct cerebrospinal fluid (CSF) flo(1). While their typical size ranges from 5 to 25 mm, cases involving significantly larger cysts have also been reported. These cysts are believed

to arise from either the embryonic neuroepithelium of the tela choroidea or endodermal remnants (2). Histologically, these cysts are lined by epithelium and contain gelatinous material composed of mucin, cholesterol, old blood, and electrolytes. (1)

Colloid cysts usually grow slowly and are most often diagnosed between the second and fifth decades of life. Cases occurring in the first decade of life are rare, accounting for only 1–2% of all reported instances. (3). In our case, the patient was diagnosed at age six following recurrent headaches but remained entirely asymptomatic in the years that followed.

Colloid cysts are often discovered incidentally on imaging, as many patients can remain asymptomatic for prolonged periods. When symptoms do occur, headache is the most common initial complaint, usually described as intermittent, intense, and short-lived. It is often localized to the frontal region and commonly accompanied by nausea and vomiting. A distinguishing feature is that symptoms may improve when the patient lies down, a pattern atypical of other intracranial masses. These headaches are thought to result from transient obstruction of CSF flow at the foramen of Monro, caused by a ball-valve mechanism that leads to sudden elevations in intracranial pressure (4). Gradual CSF buildup may also cause more subtle symptoms such as gait disturbance, urinary incontinence, memory deficits, or altered mental status (1). Drop attacks, sudden lower limb weakness leading to falls without loss of consciousness, have also been reported (2).

Although rare, acute neurological decompensation and sudden death can occur. Reported rates of rapid neurological deterioration range widely from 3% to 35%, with mortality rates estimated between 5% and 38% (5). The underlying mechanism of sudden neurological decompensation or death in patients with colloid cysts remains a subject of debate, with several hypotheses being proposed. One theory suggests that the cyst may exhibit relative mobility along its pedicle, resulting in intermittent obstruction of the foramen of Monro. This can lead to abrupt obstructive hydrocephalus, increasing the intracranial pressure and potentially precipitating transtentorial herniation. Another proposed mechanism involves acute intralesional hemorrhage, leading to rapid cyst expansion and subsequent foramen of Monro obstruction. Additionally, direct compression of the hypothalamus by the cyst has been implicated in the disruption of hypothalamic-mediated autonomic cardiac regulation, which may induce sudden cardiac arrest, even in the absence of pre-existing cardiac pathology (1, 3, 6).

Due to the intermittent and often non-specific nature of symptoms, timely diagnosis of colloid cysts relies heavily on neuroimaging, with magnetic resonance imaging (MRI) and computed tomography (CT) scans serving as essential tools for detection and assessment. In our patient, CT revealed a well-defined, homogeneous lesion at the anterior third ventricle consistent with a colloid cyst. Most colloid cysts appear hyperdense on CT, as was observed here, although some may be isodense to surrounding brain tissue. This hyperdensity correlates with increased viscosity of cyst contents (2).

MRI, while not detailed in this case, is known to demonstrate variable signal intensities for colloid cysts due to their proteinaceous fluid and possible hemorrhagic components. MRI is particularly valuable in differentiating colloid cysts from other lesions that may mimic their appearance on CT, such as basilar tip aneurysms or Rathke cleft cysts(2).

The primary challenge following the diagnosis of a colloid cyst lies in selecting the appropriate management approach. Management of colloid cysts remains a clinical challenge, particularly in balancing the risks of surgical intervention against the potential for sudden deterioration in otherwise healthy individuals. Treatment decisions are typically guided by symptom severity, cyst size, and radiological findings, yet a consensus on the optimal approach is lacking (1).

For symptomatic patients, particularly those presenting with hydrocephalus, surgical resection is considered the standard of care (7). Treatment options include microsurgical approaches (craniotomy with transcallosal or transcortical excision), endoscopic removal, and stereotactic aspiration. Microsurgical resection offers the highest likelihood of complete removal with the lowest recurrence rate but carries a higher initial surgical risk. Endoscopic techniques, on the other hand, are less invasive and allow for faster recovery, though they are associated with a higher rate of incomplete resection and recurrence. In the emergency setting, CSF diversion through EVD placement may be lifesaving and serve as a bridge to definitive treatment (1, 2, 7).

The management of asymptomatic patients is more controversial. Observation has traditionally been considered appropriate for small, centrally located cysts without ventriculomegaly (2). However, several case reports and series have documented acute deterioration and sudden death in previously asymptomatic individuals under surveillance (1). In particular, cysts exceeding 1 cm in diameter have been repeatedly associated with a higher risk of acute neurological decline (2). A study has shown that nearly all reported cases of fatal deterioration involved cysts ≥1 cm, with one study noting a mean cyst diameter of 2.0 cm among deceased patients (7). In this context, surgical intervention is generally recommended for cysts larger than 1 cm, even in asymptomatic individuals (8).

Despite attempts to correlate radiological and clinical features with risk, no single variable has reliably predicted outcomes. To address this gap, Beaumont et al. proposed the Colloid Cyst Risk Score (CCRS), a risk stratification tool designed to identify patients at higher risk of acute obstructive hydrocephalus. The CCRS allocates one point for each of the following (7, 9):

- Patient age under 65 years
- Presence of headache
- Cyst diameter of ≥7 mm on axial imaging
- Hyperintensity on FLAIR MRI sequences
- Location within specific anatomically high-risk zones of the third ventricle.

Scores range from 0 to 5, with higher totals correlating with increased risk of symptomatic disease and obstructive hydrocephalus. Beaumont et al. classified patients with CCRS ≥4 as high risk, those with a score ≤2 as low risk, and a score of 3 as intermediate risk. While not yet externally validated, the CCRS demonstrated high sensitivity and specificity in its initial cohort and may serve as a helpful tool in guiding early surgical decisions,(7, 9).

In the case of our patient, the cyst measured approximately 1.4 × 1.45 × 1.5 cm on imaging and was located at the anterior third ventricle, consistent with a high-risk anatomical zone. Application of the CCRS would likely have yielded a high score, supporting early surgical intervention. Ideally, the cyst should have been removed electively once it surpassed 1 cm, even in the absence of symptoms. Unfortunately, the details surrounding the patient's clinical course over the two decades since diagnosis remain unclear. It is unknown whether the cyst was initially smaller and considered low-risk, or whether surgical intervention was declined by the patient or his family. Regardless, routine follow-up and serial imaging might have detected progressive cyst enlargement, providing an opportunity for timely resection before the catastrophic event. This case underscores the need for long-term monitoring and reassessment in patients diagnosed with colloid cysts, especially as they enter early adulthood.

4. Conclusion

Colloid cysts, though histologically benign, carry a risk of sudden and potentially fatal complications due to their critical location near the foramen of Monro. While the morbidity and mortality associated with these lesions are well recognized, the specific factors that predict poor outcomes remain controversial. The Colloid Cyst Risk Score (CCRS) offers a promising framework for risk stratification, but it requires external validation before widespread adoption. In the absence of robust predictive tools or definitive guidelines, maintaining a low threshold for surgical intervention, especially in young patients with cysts ≥1 cm, remains a cautious and reasonable approach.

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