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Original Article

Diverse Presentation of Intraventricular Colloid Cysts – A Tale of Eight Cases

G Mohanraj[1], R J V V Prasad[2], M Vijayanand[2]

[1]Assistant Professor, Department of Neurosurgery, Madurai Medical College, Madurai, Tamil Nadu, India, [2]Resident, Department of Neurosurgery, Madurai Medical College, Madurai, Tamil Nadu, India

Abstract

Introduction: Colloid cysts are one of the benign intracranial tumors most commonly occurring in the rostral part of the third ventricle. These may present with varied spectrum of clinical features that poses challenges in clinical diagnosis. The presentation may range from being asymptomatic to simple headaches, seizures, and even sudden death. Most of the symptoms can be attributed to the development of obstructive hydrocephalus. Chemical or aseptic meningitis is unusual complication posing complicating differential diagnosis. We describe eight such cases with wide variety of symptoms.

Materials and Methods: We present a case series of eight cases of the third ventricle colloid cysts presented at our institute. Age of the patients ranged from 15 to 55 and five of them were females. All the clinical features were recorded from each one of them. Computed tomography and magnetic resonance imaging were used to diagnose the condition. Four of them underwent excision of the cyst in single stage either by open or endoscopic approach. Two patients underwent preliminary ventriculoperitoneal shunt done in the view of poor neurological status and craniotomy and excision was done in later stage. In one patient bedside external ventricular drain was inserted for emergency decompression of ventricles. One patient is under serial radiological follow-up.

Results: Eight cases that we observed had wide variety of symptoms. Six patients had chronic headache with progressive severity, and four of them had nausea with vomiting, three patients had seizures. The cysts in two patients were discovered accidentally, during the evaluation of seizures in one patient and others in evaluation of traumatic head injury. One elderly patient had presented with psychiatric symptoms, drop attacks along with the features of normal pressure hydrocephalus. One teenage patient presented with sudden deterioration and went into cardiac arrest even after emergency decompression of ventricles done. Seven of them underwent surgery and one of them succumbed. The surgery improved health in all other seven patients.

Conclusion: Colloid cysts may present with a wide range and beyond expected neurological manifestations. The severity or rapid clinical deterioration does not exactly correlate with depending on the site, size of the cyst. Leaking cysts with chemical meningitis may further complicate the diagnosis. Hence, early diagnosis and surgery with complete removal of cysts offer better clinical outcomes in those patients.

Key words: Colloid cyst, Obstructive hydrocephalus, Sudden cardiac arrest, Surgical removal, Third ventricle

INTRODUCTION

In 1858, Wallmann first reported on colloid cysts. In 1921, Dandy succeeded in complete resection of a colloid cyst through a transcortical-transventricular approach. Colloid cyst is one of the benign lesions constituting nearly 15–20% of intraventricular tumors.[1,2] In most of the cases, these are solitary and sporadic and rarely familial forms are documented.[3-5] They usually occur in the anterior and anterosuperior part of the third ventricle.[6,7] In all the five cases of described here, a solitary colloid cyst of the third ventricle was the common pathology. However, they differed in their clinical presentation. Various symptoms are characteristic of colloid cysts that may be detected incidentally for unrelated symptoms or due to specific problems caused by the cyst itself. These are often the result of different forms of hydrocephalus as well as irritation of major important centers around the third ventricle.[6,8-10] In

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Corresponding Author: Dr. G Mohanraj, Department of Neurosurgery, Prime Minister Swasthya Suraksha Yojana Block, Government Rajaji Hospital, Panagal Road, Madurai - 625 020, Tamil Nadu, India.

addition to headache, nausea, and vomiting, the symptoms may also present as disorders of consciousness, psychiatric symptoms, and even sudden death.

CASE REPORTS

We present a case series of eight cases of the third ventricle colloid cysts presented at our institute. The patient's demographic details, symptoms, radiological findings, and management are tabulated [Table 1].

Case 1

A 36-year-old male, headache, nausea, and vomiting, and two episodes of seizures, on computed tomography (CT) brain, there was hyperdense lesion in 3rd ventricle with features of hydrocephalus. On magnetic resonance imaging (MRI), lesion was 11*15 mm hypointense on T1 and T2 [Figure 1]. Patient underwent endoscopic excision of the colloid cyst. Post-operative period was uneventful.

Case 2

A 46-year-old female presented with nausea and vomiting for a few days followed by sudden deterioration in consciousness. On CT Brain, there was hyperdense lesion occluding both foramen of Monro, causing obstructive hydrocephalus. On MRI, the lesion was 20*23 mm which was non enhancing on contrast [Figure 2]. The patient underwent right ventriculoperitoneal shunt followed transcranial excision.

Case 3

A 54-year-old male presented with headache, nausea, and vomiting with altered behavior and features of normal pressure hydrocephalus and drop attacks. MRI brain showed 25*23 mm T1 and T2 hypointense lesion with classic DOT sign [Figure 3]. The patient underwent endoscopic excision of cyst. The patient is asymptomatic now.

Case 4

A 40-year-old female presented with chronic headache and seizures. During evaluation, MRI brain showed 24*30 mm contrast-enhancing lesion in rostral part of 3rd ventricle with classic DOT sign [Figure 4]. The patient underwent transcranial excision of the cyst. The cyst was glistening white with soft and gelatinous consistency [Figure 5]. The post-operative period was uneventful.

Case 5

A 30-year-old female admitted with head injury. On CT brain, there was hyperdense lesion in 3rd ventricle without feature of hydrocephalus. On MRI, it was 6*6 mm colloid cyst [Figure 6]. The patient is asymptomatic. She is on periodic follow-up.

Case 6

A 45-year-old female admitted with headache, nausea, and vomiting. On MRI brain 15*18 mm contrast-enhancing

Table 1: Case reports: The clinical features, radiology, and treatment

Cases	Age	Sex	Clinical features	Computed tomography scan	Magnetic resonance imaging	Size	Procedure
Case 1	36	Male	HA, N/V, seizures	Hyperdense lesion at ant part of third ventricle	T1 hyper, T2/T2 flair hypointense lesion	15×11 mm	Endoscopic excision
Case 2	46	Female	HA, N/V, altered sensorium	Hyperdense lesion in rostral third ventricle occluding both the foramen of Monro	T1 hyper, T2/T2 flair hypointense and contrast non-enhancing lesion	20×23 mm	Right ventriculoperitoneal shunt followed by transcranial excision
Case 3	54	Male	HA, N/V, psychiatric symptoms, f/o NPH, and drop attacks	Hyperdense lesion at ant. part of third ventricle near right foramen of Monro	T1 iso, T2/T2 flair hypointense with classical "DOT" sign	25×23 mm	Endoscopic excision
Case 4	40	Female	Seizures, chronic headache	Hyperdense lesion at rostral part of third ventricle	T1hyper, T2/T2 flair hypointense lesion with "DOT" sign	24×30 mm	Transcranial excision
Case 5	30	Female	No symptoms	Hyperdense lesion at ant. part of third ventricle near left foramen of Monro	T1 iso, T2/T2 flair hypointense lesion	6×6 mm	Periodic observation
Case 6	45	Female	HA, N/V, seizures	Not available	T1 iso, T2 hypo, contrast enhancing lesion	15 × 18 mm	Endoscopic excision
Case 7	35	Female	HA	Hyperdense lesion in rostral third ventricle occluding both the foramen of Monro	T1 iso and T2 hyperintense lesion at rostral 3rd ventricle	20×13 mm	Right ventriculoperitoneal shunt followed by transcranial excision
Case 8	15	Male	Sudden deterioration	Hyperdense lesion in third ventricle with obstructive hydrocephalus	Could not be taken	22×26 mm	External ventricular drainage

HA: Headache, N/V: Nausea and vomiting

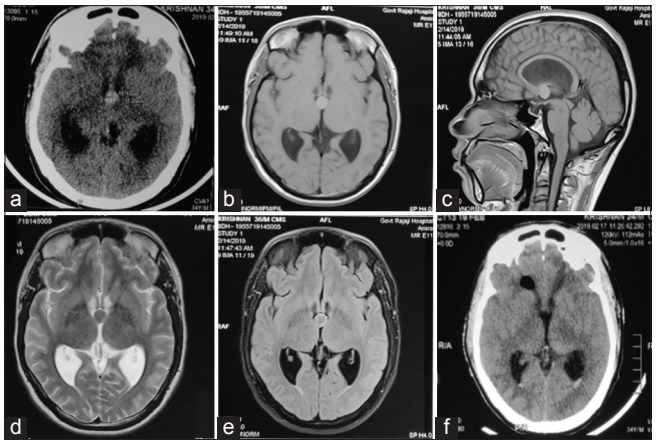

Figure 1: (a) Plain computed tomography (CT), axial view shows hyperdense lesion in third ventricle, (b and c) hyperintense lesion in T1 axial and sagittal planes, (d and e) hypointense on T2 and flair images, and (f) post-operative CT exhibiting complete removal of the cyst

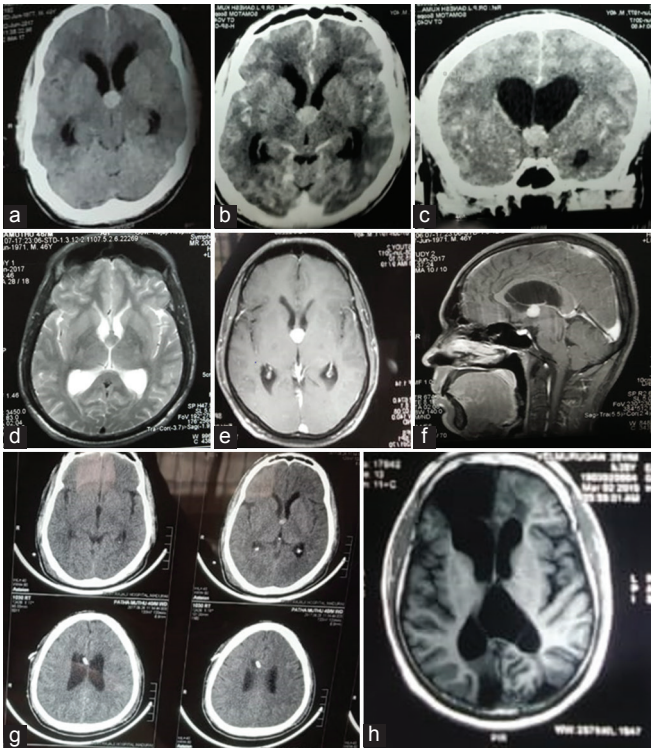

Figure 2: (a) Plain computed tomography (CT), axial view shows hyperdense lesion in third ventricle, (b and c) hyperdense lesion in contrast-enhanced CT axial and coronal planes, (d) hypointense on T2, (e and f) T1 contrast, axial, and sagittal show hyperintense lesion. (colloid cysts usually does not take up contrast) post-operative: (g) Successful decompression of ventricles after VP shunt (Stage 1), and (h) post-operative magnetic resonance imaging shows complete removal of the cyst (Stage 2)

lesion in 3rd ventricle [Figure 7]. Endoscopic excision of the cyst was done. On histopathology, it showed feature of colloid cyst. Postoperatively, the patient is doing well without any major morbidity.

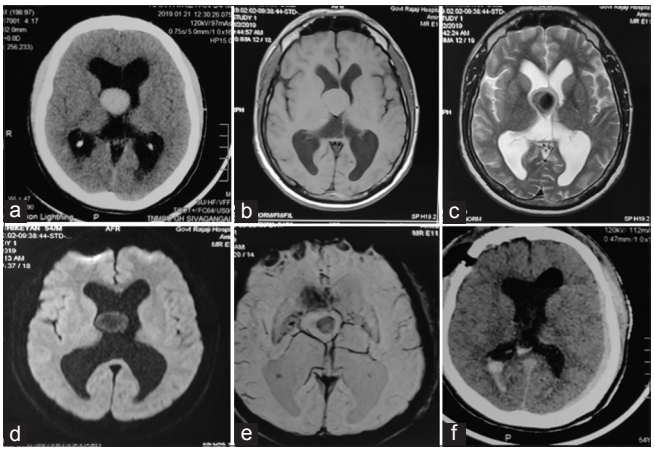

Figure 3: (a) Hyperdense lesion on computed tomography axial, (b) isodense lesion on T1 image, (c) classical "DOT" sign on T2 magnetic resonance imaging, (d) no diffusion restriction on diffusion-weighted images, (e) no blooming on SWI, and (f) post-operative images show complete excision of tumor

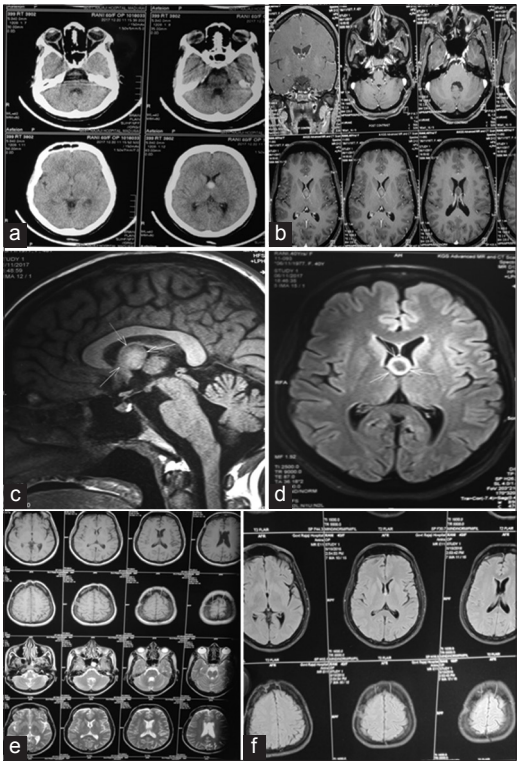

Figure 4: (a) Hyperdense lesion in plain computed tomography brain, (b) contrast-enhancing lesion in rostral third ventricle, (c) hyperdense lesion on plain magnetic resonance imaging (MRI), (d) "DOT" sign on flair MRI post-operative: (e and f): MRI brain after complete excision of lesion

Case 7

A 35-year-old female presented with chronic headache with papilledema. On CT brain, there was hyperdense lesion in 3rd ventricle, causing obstructive hydrocephalus. An emergency right VP shunt was done to decompress the ventricles. On MRI, there was 20*13 mm hyperintense

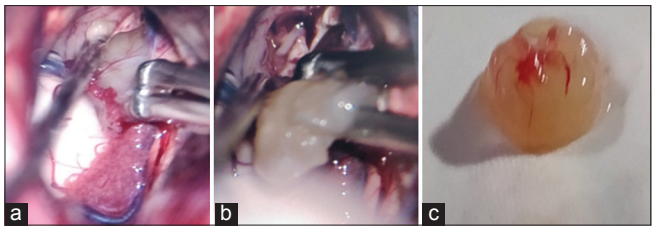

Figure 5: Intraoperative images: (a) Colloid cyst seen after opening third ventricle, (b) excision of the cyst, and (c) colloid cyst specimen removed

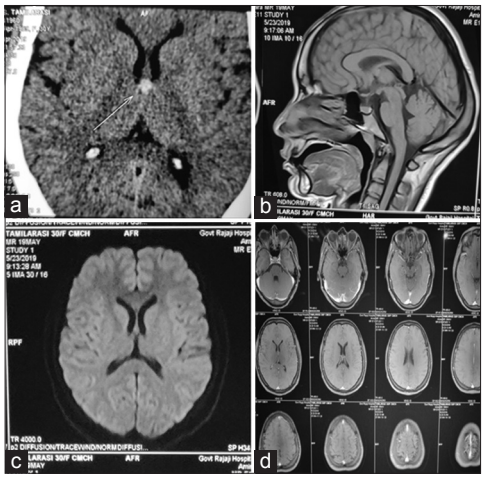

Figure 6: (a) Plain computed tomography, axial view shows hyperdense lesion in third ventricle. (b) MRI brain plain in saggital section shows tiny iso intense lesion on T1, (c) Diffuse restriction on diffusion-weighted images, (d) tiny contrast-enhancing cyst

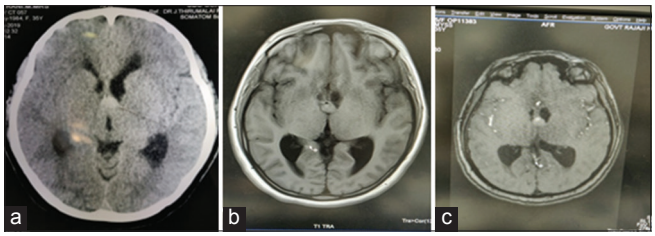

Figure 7: (a) Plain computed tomography, axial view shows hyperdense lesion in third ventricle. (b) Hyperintense lesion in T1, (c) contrast-enhancing

lesion in rostral part of 3rd ventricle [Figure 8]. Later patient underwent transcranial excision of the cyst.

Case 8

A 15-year-old young boy, presented with sudden unconsciousness. On CT brain there was hyperdense lesion in 3rd ventricle, causing obstructive hydrocephalus [Figure 9]. An emergency bedside external ventricular drainage was done, but he went into sudden cardiac arrest and succumbed to death.

Seven of them underwent surgery and one of them succumbed. The surgery improved health in all other

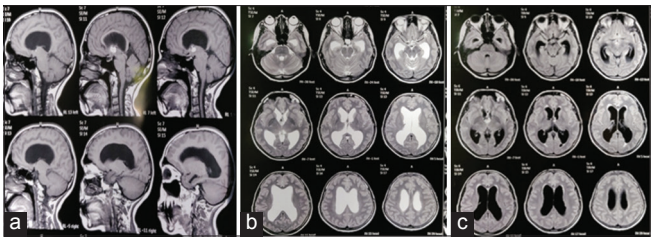

Figure 8: (a) Magnetic resonance imaging shows hyperdense lesion in third ventricle in T1, (b) hypo in T2, (c) contrast-enhancing lesion in rostral third ventricle

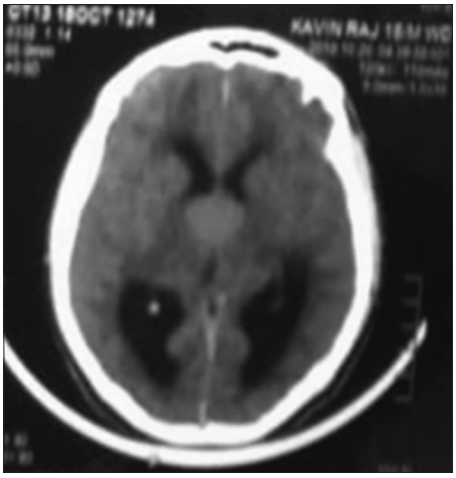

Figure 9: Computed tomography brain of 15-year-old boy shows hyperdense colloid cyst in third ventricle with obstructive hydrocephalus. Patient died due to sudden cardiac arrest

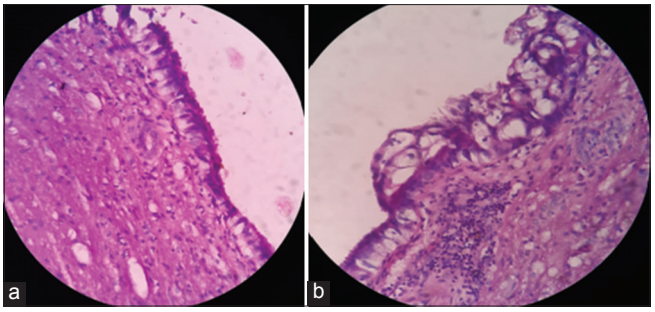

Figure 10: (a) Microscopic images show cyst wall lined by ciliated columnar cells with mucin and (b) vacuolated cytoplasm is noted

seven patients. Histopathology in all cases showed ciliated columnar epithelium with mucin and vacuolated cytoplasm characteristic of colloid cysts [Figure 10].

Observation

Of eight cases in our study, five patients were in the age group of 30–40 and two above 40 and 15-year-old young patient. Among them five were females. Headache was the most common symptom and was present in six patients. Most of the time, it was chronic headache varying in severity.

Five of six patients complained of holocranial headache. Five cases had nausea and vomiting which was more in early morning with severe headache suggestive of raised intracranial pressure. Psychiatric symptoms along with features of normal pressure hydrocephalus patient and drop attacks were reported in one patient. Three patients had presented with seizures, and one among them was incidentally found while evaluating for seizures. Cyst was incidentally detected in one patient while evaluating for head injury without any preceding symptoms. One young patient had rapid deterioration with sudden cardiac arrest [Table 2].

Two of the above cases underwent transcranial approach and two underwent endoscopic total excision of the cyst in a single stage. Two cases required emergency cerebrospinal fluid (CSF) diversion in the view of deteriorating neurological as well as clinical status; hence, right ventriculoperitoneal shunt was done followed by transcranial excision of the cyst in the second stage once patient improved. Post-operative period was unevent full in all these cases and was discharged and being followed up. One of the asymptomatic cases with small colloid cyst is under serial clinic radiological observation and one case, a young 15-year-old presented with sudden deterioration in unconscious state. Cardiopulmonary resuscitation was initiated immediately, and bedside external ventricular drain was placed since he was unfit for major surgery, but patient died due to sudden cardiac arrest.

DISCUSSION

Colloid cyst of third ventricle is a pathological condition which constitutes around 2% of brain tumors and most commonly occurring in third to fifth decade. About 80% of the patients with colloid cyst reported in literature are aged 30–60 years. Approximately 15–20% of all intraventricular masses are colloid cysts. Colloid cysts develop in the rostral aspect of the third ventricle in the foramen of Monro in 99% of cases, and despite their benign histology, they may carry high risks and neurologic complications, with a mortality reported from 3.1% to 10% in symptomatic cases or 1.2% in total.[11,12] Although these tumors are considered congenital, their presentation in childhood is rare (the youngest reported case involved a 2-month-old infant). The increased use of computed tomography (CT) and magnetic resonance imaging (MRI) has resulted in an increased number of patients being diagnosed.

Colloid cysts are often found incidentally, but when symptomatic, they present with obstructive hydrocephalus and paroxysmal headaches. These headaches are typically due to raised intracranial tension and are severe in early mornings. Other symptoms are gait disturbances, short-term memory loss, nausea, vomiting, and behavioral changes.[12] Sudden loss of tone in lower limbs with falls and without loss of consciousness (drop attacks) has been reported in few cases. In addition, symptoms similar to normal-pressure hydrocephalus (e.g., dementia, gait disturbance, and urinary incontinence) have been associated with the presentation of colloid cysts. One of the studies shows that 8% of asymptomatic patients with a colloid cyst of the third ventricle eventually became symptomatic;[13] however, a different study found 34% of symptomatic patients presented to a hospital with acute deterioration and in some cases sudden death.[14] Pollock *et al.* described the four most important factors associated with cyst-related symptoms[13] such as younger patient age, cyst size, ventricular dilation, and increased cyst signal on T2-weighted MRI.

In some instances, due to sudden blockage of foramen of Monro and resulting obstructive hydrocephalus causes sudden loss of consciousness and, if not intervened at the right time, results in death due to herniation. Another theory which explains sudden death in patients with colloid cysts is that the acute neurogenic cardiac dysfunction (secondary to the acute hydrocephalus) and subsequent cardiac arrest. The risk of sudden death remains difficult to predict. Cyst size and extent of ventricular dilatation do not seem to predict for acute deterioration.[15] One of our patients had similar rapid deterioration and died due to sudden cardiac arrest.

Due to the wide range of symptomatology, the imaging modalities such as CT and MRI remain the mainstay tool

Table 2: Spectrum of clinical variation

Cases	Headache	Nausea/vomiting	Psychiatric symptoms	Seizures	Altered mentation	Sudden deterioration	Feature of NPH	Drop attacks
Case1	✓	✓		✓				
Case2	✓	✓			✓			
Case3	✓	✓	✓				✓	✓
Case4	✓			✓				
Case5								
Case 6	✓	✓		✓				
Case 7	✓	✓			✓			
Case 8						✓		

for diagnosis.[16,17] The diverse appearance on imaging depends on the composition of the cysts.[17,18] Cysts with a high content of cholesterol and protein are hyperdense on plain CT, hyperintense on T1-weighted, and hypointense on T2-weighted MRI sequences.[16-18] An intracystic low T2 "DOT" is a common MRI feature of colloid cysts of the third ventricle. The hyper density noted in CT scan depends on the solidity of the contents of colloid cyst. In all our patients, CT scan showed hyperdense lesion which was evident also during the operation. The cysts were filled with gelatinous and dense content. Colloid cysts do not take up contrast either on CT or on MRI. This is not a feature of most of the colloid cysts.[18,19]

Surgery remains mainstay of treatment in colloid cysts. The three approaches most commonly used are the transcortical approach, the interhemispheric transcallosal approach, and the endoscopic approach. In few cases, stereotactic drainage/aspiration has been used, but failure to achieve complete aspiration remains major drawback in this technique. Furthermore, the recurrence rate is high because the cyst wall is usually retained. The endoscopic approach also carries a higher rate of incomplete cyst resection, which may increase recurrence rates. Microsurgical resection through either the transcortical-transventricular or transcallosal approach is still considered the criterion standard for treatment of symptomatic patients with colloid cysts.[20] In one of the studies, the authors conclude that every attempt must be made to completely remove the cyst wall and contents.[21] Rarely, subfrontal lamina terminalis approach may be used.[22,23] The likelihood of complications is higher in those cysts, which are rapidly increasing (bleeding into cyst) and in large cysts.[14,24,22,25] If the patient is clinically unstable and not fit for surgery, emergency ventricular drainage is indicated and bilateral ventricular drainage plays the role. If there is no neurological deterioration and patient is clinically fit, CSF diversion is not indicated because enlarged ventricles can facilitate the surgical approach.

Patients in whom asymptomatic colloid cysts are diagnosed can be cared for safely with observation and serial neuroimaging. If a patient becomes symptomatic, the cyst is enlarging, or hydrocephalus develops, prompt neurosurgical intervention is necessary to prevent the occurrence of neurological decline from these benign tumors.[9] In our study, one such asymptomatic patient is in regular clinicradiological follow-up.

CONCLUSION

Colloid cyst of third ventricles, even though benign, may present with a wide variety of symptoms irrespective of patients age, size, or location and also carry high risk of clinical and neurological deterioration due to sudden onset hydrocephalus thus posing a great challenge in diagnosing and treating this unique condition. CT and MRI remain the best diagnostic tool until now. In this study, we encountered eight such cases in 1 year and each case has surprised and challenged us with its presentation. A solid clinical acumen is necessary in diagnosing and treating such cases for it can be cured completely with appropriate surgical approach.

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