Colloid Cyst of the Third Ventricle: Case report and Literature Review

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CASE REPORT

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ABSTRACT

Background: Colloid cysts account for approximately 1% of all intracranial tumors and are the most common type of the neuroepithelial cysts. They are benign, that most commonly occur in the third ventricle near the Monro foramen. Sometimes they have no specific signs and symptoms and may be confused and misdiagnosed with other pathology of nervous systems, but sometimes they may produce acute hydrocephalus, brain herniation, and lead to death. Objective: We present a case of a 40 years old male patient with brain colloid cyst. Discussion: The patient was admitted at Clinic of Radiology, for headache and episode of vomit. He was treated for signs and symptoms of depression since 2017. In clinical examination patient had symptoms of brain tumor. The MRI scan demonstrated a cyst in foramen Monroe region with typical signal intensities in the formation that confirm the diagnosis of colloid cyst as delayed of lateral ventricle as signs of early hydrocephalus. After diagnosis the patient was recommended to consult with a Neurosurgeon for intervention. The cyst was removed and similar findings revealed also on histopathological examination. Many of colloid cysts manifest with no specific signs and symptoms that may be confused with depression. Conclusion: On rare occasions, they may completely and irreversibly obstruct the foramen of Monroe, resulting in sudden loss of consciousness and, if patients are not treated, in coma and death. So carefully check the MRI scans is very important, not only in diagnosis but also in planning of treatment.

Keywords: Colloid cyst, brain, MRI scans, depression, headache.

1. INTRODUCTION

Colloid cysts are rare intracranial lesions occurring in approximately three individuals per million per year (1). Some colloid cysts result in acute onset of hydrocephalus and may lead to sudden death. The most common imaging finding is that of a rounded mass in the anterior aspect of the third ventricle. On computer tomography (CT), the lesions are often hyperdense, and their magnetic resonance imaging (MRI) features are variable (2).

We present the clinical and imaging findings in a patient with a colloid cyst, and provide a gross anatomic and histopathologic correlation.

Correlations between MRI features and cyst content could potentially help surgeons decide on the extent of resection and approach.

Colloid cysts are among rare benign tumors of the third ventricle. Although the most frequent symptoms are headache and syncope, arrested hydrocephalus or sudden death could appear with colloid cysts. The aim of this pictorial essay was to increase awareness of the clinical presentation and MRI spectrum, and treatment options of the colloid cysts.

Cysts that are especially rich in protein and cholesterol tend to be hyperdense on CT, hypointense on T2-weighted sequences and hyperintense on T1-weighted sequences. These cysts are viscous, and the success of aspiration is significantly low. In the diagnosis and evaluation of small-sized cysts that have an ingredient similar to cerebrospinal fluid, 3-dimensional sequences might be
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useful. The radiologic appearances of colloid cysts could play an important role in directing these patients to alternative surgical modalities, including resection.

In CT typically seen as a well-defined, rounded lesion at the roof of the 3rd ventricle: unilocular, typically hypodense, isodense and hypodense cysts are uncommon, calcification is uncommon (2).

MR signal characteristics include: **FLAIR:** cysts which are of low signal on T2 will appear similar to attenuated cerebrospinal fluid (CSF) on FLAIR, and are thus difficult to appreciate (4).

**T1:** variable ~50% high signal, the rest are hypointense or isointense to adjacent brain.

**T1 C+ (Gd):** only rarely demonstrates thin rim enhancement, but usually this represents an enhancement of the adjacent and stretched septal veins (3).

**T2:** most are of low T2/T2* signal (short T2), related to thick “motor oil” consistency fluid, some have central low T2 and high peripheral T2 signal, some are homogeneously high signal (4, 5).

2. CASE PRESENTATION

We present a case of 40-year-old male patient with a colloid cyst in the third ventricle. The patient was admitted at Clinic of Radiology, with symptoms of headache and episodes of vomit. In clinical examination patient had symptoms of brain tumor. He was treated for depression since 2017. A year ago he underwent a MRI head scan, where dilation of lateral ventricle was seen as sign of early hydrocephalus.

The MRI scan demonstrated a cyst in foramen of Monro region with typical signal intensities in the cystic formation that confirmed the diagnosis of colloid cyst (Figure 1). In MRI images, they present as homogeneously to heterogeneously hypointense or hyperintense masses in T1 and T2 weighted acquisitions. The outstanding characteristic is a sharply outlining round or ovoid mass in the anterior and superior third ventricle, near or at the foramen of Monro region. Hydrocephalus is observed in most patients (4, 5). After diagnosis the patient was recommended to consult with a Neurosurgeon for intervention. The patient underwent surgical intervention and the cyst was removed. Similar findings were revealed also on histopathological examination (Figure 2, Panels a, b, c, d, e and f). After the intervention the patient did post-operative MRI exam control as recommended where it was evidenced successful tumoral extraction while the histopathologic results described findings compatible with colloid cyst Fig 2.

A colloid cyst can be removed with a craniotomy. A craniotomy is a surgery where an incision is made in the scalp, and part of the skull is removed for the duration of the surgery then the skull is put back in place.

On the T1-weighted images, the lesion showed a cen-
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1. CLINICAL PRESENTATION

The patient was a 40-year-old male with a history of headaches and cognitive decline. Imaging revealed a mass lesion in the third ventricle with findings consistent with a colloid cyst.

2. IMAGING FINDINGS

Axial plane T1 showing surgical cavity post-operating (arrows). Axial plane T2-weighted showing colloid cyst post-operating (arrows). Axial FLAIR showing surgical cavity post-operating with oedema (arrows). Axial plane Diffusion-weighted imaging (DWI) showing DWI diffuse restriction hypersignal zone in the cerebral tissue around the surgical cavity post-operating (arrows). Sagittal plane T1 showing surgical cavity post-operating (arrows). Coronal plane T2-weighted showing surgical cavity post-operating (arrows).

3. PATHOLOGY

Colloid cysts originate from the abnormal folding of the primitive neuroepithelium (the paraphysis elements) (2, 3). They contain mucin, old blood (hemosiderin), cholesterol, and various ions, accounting for a wide range of imaging appearance.

These cysts are lined by a single layer of columnar epithelium which produces mucin, which appears as a thick yellow-green fluid when the cyst is open.

We present the imaging-pathologic correlation of a patient with a colloid cyst as well as data supporting the fact that the presence of cholesterol is probably responsible for the MRI features exhibited by some colloid cysts.

4. DISCUSSION

Colloid cysts of the third ventricle are rare lesions comprising 0.5–1% of primary brain tumors. Most re-
ported cases occur in the third to fifth decades of life (3).

Headache occurs in 68–100% of patients and is often the presenting symptom. Headaches are characterized as brief, lasting seconds to minutes, and are initiated, exacerbated, or relieved by a change in position (6). Although colloid cysts are histologically benign, they may obstruct the foramina of Monro and produce acute hydrocephalus. These lesions are a recognized cause of sudden death (7).

The cyst’s attachment to the third ventricular roof may impart a pendulous character to the lesion, whereby foramina obstruction may be intermittent. Some patients, upon awakening, complain of headache that is relieved by standing. Other symptoms include progressive dementia, drop attacks, and spells of transient loss of consciousness. In children, the most common symptoms are headache, nausea, vomiting, papilledema, and diplopia.

Although the great majority of colloid cysts arise in the anterior third ventricle, rare examples in the lateral ventricles, fourth ventricle and outside the ventricular system have been reported (8-11). Histologically, colloid cysts are characterized by a simple to pseudostratified epithelial lining with interspersed mucous goblet cells and scattered ciliated cells (Figure 4).

Using MR imaging, colloid cysts have a variable appearance. MRI may occasionally show intracytic fluid levels or central and peripheral components in the lesion. Some colloid cysts are homogeneous in appearance. About 50% of colloid cysts are hyperintense on T1-weighted images, and the rest are either isointense or hypointense with respect to brain (Figure 2, Panel a). On T2-weighted images, most colloid cysts are hypointense to the brain (Figure 2, Panel b). Cysts that are hypointense on T2-weighted sequences may be difficult to visualize using fluid-attenuated inversion recovery images (FLAIR) (Figure 2, Panels a and b). Isointense cysts may be difficult to identify on MRI and may be more easily seen on CT scans (8). The T2 features of some colloid cysts are the reversal of their pattern as seen on T1-weighted images (as shown in our patient). Because the central portion of most colloid cysts tends to be of low T2 signal intensity, it has been suggested that paramagnetic effects may be responsible for their MRI characteristics.

5. CONCLUSION

Colloid cysts are rare lesions arising in the superior third ventricle and may present in acute hydrocephalus, which may be fatal. The origin of colloid cysts continues to be a matter of debate. Their MRI signal characteristics are variable and mostly dependent on the cholesterol and protein contents and not on the presence of paramagnetic minerals. Despite their variable signal characteristics, their location and shape allow for the correct preoperative diagnosis in most patients. The patient underwent magnetic resonance imaging which clearly showed a colloid cyst of the third ventricle with accompanying obstructive hydrocephalus. Such lesions are potentially life-threatening if undiagnosed. It is suggested that magnetic resonance imaging has an important role to play in rapidly and clearly demonstrating the location, size and complications of such lesions.

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