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Colloid Cyst of the Third Ventricle: Sometimes More Conspicuous on CT than MR

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Summary: We present two cases of surgically proved colloid cysts that were more apparent on CT scans than on MR images. These cysts, while hyperdense on CT scans, were nearly isointense with brain on multiple MR sequences. This relative lack of visibility represents a potential pitfall when imaging a patient with headache.

Case Reports

Case 1

A 36-year-old man had a 10-year history of headaches that had increased in intensity during the month prior to admission and that had become associated with flashing lights in all visual fields. Physical examination was unremarkable except for a mild facial droop at rest. CT scans showed a high-attenuation lesion in the anterior third ventricle, consistent with a colloid cyst (Fig 1). MR imaging was performed, but the tumor was less evident, as the cyst was isodense with brain on both T1- and T2-weighted studies. MR sequences included sagittal images (633/11/1) with a section thickness of 5 mm and a 2-mm gap, axial images (2500/17/1) with a section thickness of 6 mm and a 3-mm gap, axial images (3000/108/1) with a section thickness of 6 mm and a 3-mm gap, and axial images (416/26/1) with a section thickness of 6 mm and a 3-mm gap. Contrast-enhanced images were obtained in the axial plane (416/26/1.5) with a section thickness of 6 mm and a 3-mm gap, in the coronal plane (620/26/1) with a section thickness of 6 mm and a 3-mm gap, and in the sagittal plane (500/12/1) with a section thickness of 4 mm and a 1-mm gap. Although no enhancement of the cyst was evident, it was more conspicuous on the axial and sagittal contrast-enhanced images.

The patient responded briefly to conservative therapy; however, surgery was recommended after a recurrence of symptoms. A transcervical microsurgical approach was recommended, and the tumor was resected. Pathologic findings were consistent with a colloid cyst.

Case 2

A 34-year-old woman had severe headaches, which occurred daily, frequently causing her to awaken from sleep. They were usually associated with nausea and vomiting. A CT study revealed a high-attenuation colloid cyst in the usual third ventricular location (Fig 2). MR imaging was also performed, but the tumor was less evident, as the cyst was isodense with brain on both T1- and T2-weighted studies. MR sequences included sagittal images (633/11/1) with a section thickness of 5 mm and a 2-mm gap, axial images (2500/17/1) with a section thickness of 6 mm and a 3-mm gap, axial images (3000/108/1) with a section thickness of 6 mm and a 3-mm gap, and axial images (416/26/1) with a section thickness of 6 mm and a 3-mm gap. Contrast-enhanced images were obtained in the axial plane (416/26/1.5) with a section thickness of 6 mm and a 3-mm gap, in the coronal plane (620/26/1) with a section thickness of 6 mm and a 3-mm gap, and in the sagittal plane (500/12/1) with a section thickness of 4 mm and a 1-mm gap. Although no enhancement of the cyst was evident, it was more conspicuous on the axial and sagittal contrast-enhanced images.

The patient responded briefly to conservative therapy; however, surgery was recommended after a recurrence of symptoms. A transcervical microsurgical approach was recommended, and the tumor was resected. Pathologic findings were consistent with a colloid cyst.

Discussion

Colloid cysts are potentially dangerous tumors, because they often generate nonlocalizing symptoms but are associated with sudden death, even in children (1, 2). With the availability and widespread use of MR imaging and CT, colloid cysts are being identified more frequently, often without evidence of hydrocephalus on imaging studies. In one series reported by Camacho et al (3) of 84 patients with colloid cysts identified on CT scans, surgery was not recommended in 24 cases. In each of these cases the cysts were small and without associated hydrocephalus. However, since even small colloid cysts have been associated with sudden death, the precise criteria that differentiate cysts that require surgery from those that do not are uncertain at this time. Ryder et al (1) specifically looked at size as a predictor of outcome in 55 cases of benign third ventricular tumors (52 colloid cysts) that led to sudden death and found a size range...
of 1 to 8 cm, leading them to conclude that ventricular
tissue is not a reliable predictor of outcome.

The most common presenting symptom of colloid
cyst is intermittent headache, frequently associated
with other symptoms, such as visual changes (4).
Treatment options include surgery and stereotactic
cyst aspiration (5, 6). The attenuation of the cyst on
CT scans appears to predict the feasibility of cyst
aspiration. Isodense or hypodense cysts on CT are
more prone to successful needle aspiration (5). Kondziolek and Lunsford (5) suggested that low CT atten-
duation of the cystic contents correlates with lower
viscosity, which allows successful aspiration. Surgery
is usually via a transcallosal approach using microsurgical
techniques that allow sparing of important an-
terior third ventricular structures, specifically the fornix. There is a low prevalence of recurrence with both
procedures. In a recent review of 12 years’ experience
with both procedures in 37 patients, Mathiesen et al
(7) reported better long- and short-term results with
transcallosal surgery as compared with aspiration.

The predictable anterior third ventricular location
of colloid cysts suggests a unifying pathogenesis, but
their origin remains obscure. For some time it had
been thought that they originated from the parahy-
physis, a primitive neuroepithelium. On the basis of find-
ings reported by Shuangshoti et al (8), some authors
had classified them along with other neuroepithelial
cysts, such as choroid plexus and pineal cysts. How-
ever, more recent immunohistochemical studies sug-
gest a different cellular origin for colloid cysts, spe-
cifically endoderm (9–11). Their unusual MR
imaging characteristics also support a different origin,
as colloid cysts have a remarkably variable range of
signal intensities while choroid plexus and pineal cysts
usually resemble CSF (12).

Several theories have been proposed to explain the
range of appearances of the cyst on CT and MR
studies. One hyperdense colloid cyst, studied with
atomic emission spectrometry, had elevated levels of
sodium, magnesium, and calcium ions, which were
thought to explain the high attenuation (13). There
was so little iron found that hemorrhage was consid-
ered an unlikely cause of its CT appearance. Another
study, which compared the MR appearance with
chemical analysis, found that the high signal intensity
on T1-weighted MR images seemed to roughly follow
the concentration of cholesterol within the cyst (14).
On T2-weighted images, colloid cysts can range in
appearance from hypointense to hyperintense, and
they may be homogeneous or heterogeneous (15).
While this had been thought to reflect high concen-
trations of paramagnetic ions, this now seems un-
likely, owing to an analysis of eight colloid cysts in

**Fig. 1.** 36-year-old man with 10-year his-
tory of headaches, increasing in intensity
during month prior to admission.

A, Axial unenhanced CT scan shows
a typical high-attenuation colloid cyst
(arrow).

B, Axial MR image (2000/85) at the level
of the superior third ventricle shows only
thickening at the posterior septum (arrow)
but no evidence of abnormal signal inten-
sity.

C, Axial MR image (2000/35) also shows
no definite abnormality in the region of the
anterosuperior third ventricle.

D, Coronal contrast-enhanced MR
image (650/25) shows only mild thickening
of the septum in the region of the tumor
(arrow).

E, Sagittal MR image (600/15) shows the
colloid cyst (arrow).
which low concentrations of paramagnetic ions were found (14). The contents of the cyst in our case 2 was studied in vitro after excision and was found to be isointense with saline on a 10° flip angle gradient-echo examination. This would also support a low concentration of iron, since that sequence accentuates susceptibility effects.

It had been our experience that MR imaging was frequently superior to CT in depicting colloid cysts, particularly when they were isointense on CT scans. It would appear that a corresponding problem may exist for MR imaging in regard to small cysts that appear hyperdense on CT studies. In addition to the two examples presented here, we have encountered two other cases of colloid cysts with typical CT features, which were followed up without surgery, in which the tumor was less apparent on MR images.

In case 1 of the present study, it is possible that the relatively thick sections we used for our T2-weighted and intermediate imaging studies (8 mm) limited our ability to define this small tumor. However, the cyst was not evident on the coronal sequences either. In case 2, the cyst was larger, and the section thickness was only 6 mm. We would argue that the primary difficulty in visualizing these tumors on MR images is low contrast between cyst and brain.

**Conclusion**

In these cases, colloid cysts were visible on sagittal T1-weighted MR images as a mass superior and posterior to the normally visualized anterior commissure. Therefore, in patients with suspected colloid cysts, we recommend careful attention to a thin sagittal T1-weighted section through the midline of the brain. In some cases, however, where a small colloid cyst is suspected at MR imaging, CT may better depict the typical hyperdense colloid cyst.

*Fig 2.* 34-year-old woman with severe daily headaches, frequently causing her to awaken from sleep, and accompanied by nausea and vomiting.

A, Axial CT scan shows the high-attenuation colloid cyst (arrow).

B, Axial MR image (416/26) shows the colloid cyst as a mass at the posterior septum but isointense with brain (arrow).

C and D, MR images (3000/108) at two adjacent levels show the colloid cyst as isointense with brain (arrow).

E, Sagittal MR image (633/11) at the midline shows the colloid cyst projecting as a mass lesion (arrow) superior to the region of the anterior commissure.

F, Axial contrast-enhanced MR image (416/26) shows the cyst is of low signal intensity relative to adjacent brain (arrow).
References


