Imaging of spontaneous intraventricular rupture of a septum pellucidum colloid cyst: case report

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Intraventricular rupture of a colloid cyst is a rare phenomenon and has been proposed as a mechanism for sudden death in patients with colloid cysts. Imaging of a colloid cyst during rupture has been described in only one other instance. The authors report a highly unusual case of a 53-year-old man who presented with acute onset headaches and imaging findings of hydrocephalus caused by a colloid cyst originating from the septum pellucidum and superior surface of the roof of the third ventricle. Interestingly, the colloid cyst revealed imaging signs of intraventricular rupture characterized by a tail-like drainage of cystic contents into the occipital horn of the lateral ventricle. The patient was surgically treated with a craniotomy and transcallosal approach to the colloid cyst, where it was noted that the cyst wall was spontaneously open. This rare case highlights unique imaging findings of a rare event in an infrequent pathology confirmed with intraoperative microscopy. The authors further document the process of cyst rupture and speculate on its pathomechanisms.

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was protruding from the septum pellucidum into the third ventricle, expanding between the fornices and internal cerebral veins. The occipital horns of the lateral ventricles were noted to have a T2 hyperintense fluid level. Although pooling of fluid was noted in the ventricles, there was no longer evidence of the tail-like projection stemming from the colloid cyst. There were no other intracerebral lesions identified.

Operation and Postoperative Course

Hydrocephalus was treated on an emergency basis with an external ventricular drain. Resection of the colloid cyst was accomplished through a right frontal craniotomy and interhemispheric transcallosal approach. Upon opening of the corpus callosum and ventricular ependyma, the colloid cyst was immediately identified, and a breach was noted in the left posterolateral surface of the cyst wall, exposing the inner contents of the cyst. These intraoperative findings confirmed spontaneous rupture of the colloid cyst. Upon further dissection, the cyst was noted to arise within the septum pellucidum. The cystic contents were drained and firm nodules were resected (Fig. 3). The cyst wall was dissected from vascular structures and completely excised. The floor of the third ventricle was visible after opening of the bottom of the cyst between the fornices and internal cerebral veins (Fig. 3C).

The patient’s postoperative course was complicated by a transitory episode of akinetic mutism and delirium. He was also treated for postoperative *Staphylococcus* meningitis with antibiotics. At his last follow-up evaluation 3 months postoperatively, the patient was clinically improved with some residual difficulty with word finding and short-term and working memory difficulties.

The pathology was consistent with a colloid cyst with a ciliated pseudostratified epithelium of the cyst wall. The cyst contents were analyzed and determined to be acellular in nature with mostly protein content.

Discussion

Although pathologically benign, intraventricular colloid cysts are known for their potential to lead to acute neurological deterioration and sudden death. The underlying cause of this cascade is not known. The main hypothesis states a sudden blockade of both foramen of Monroe leading to rapid hydrocephalus. Other evidence points toward an injury to the hypothalamic cardiovascular control center through the third ventricle.

In the present case, brain CT, MR, and intraoperative images were strongly indicative of the rupture of cystic contents. Very few cases of spontaneous rupture of colloid cysts have been documented in the literature. Pathophysiologically, we suggest dividing them into hemorrhagic and nonhemorrhagic ruptures. Two cases of cyst rupture with hemorrhage were reported, both involving a hemorrhagic component at the origin of sudden enlargement of the cyst, leading to acute symptoms. In the first case, cyst rupture was diagnosed in a child at autopsy, and it was concluded that the cause of death in the child was related to acute neurological deterioration because of the third-ventricle cyst rupture and development of acute hydrocephalus. The second case documented a patient with progressive deficits over a period of weeks with imaging findings of hemorrhage into the third-ventricle colloid cyst resulting from spontaneous cystic rupture.

The 3 other nonhemorrhagic cases involved either aseptic meningitis or hydrocephalus following rupture. One report described a patient presenting with meningitis with MRI features revealing an unclear band-shaped zone in front of the medulla, suggestive of the rupture of a fourth-ventricle colloid cyst. In another report, Motoya et al. documented a patient with spontaneous regression of a third-ventricle colloid cyst, and proposed spontaneous rupture as the mechanism for the size decrease;
However, there were no documented imaging findings of cyst rupture. In the last report, Bakhtevari and colleagues described a striking case of spontaneous rupture of a giant colloid cyst with drainage of cystic contents into the lateral ventricles, and the authors coined this the "bucket sign." The current case unveils manifest radiological features characterized by easily identifiable tailing and pooling in the ventricles on brain imaging, strongly evoking extrusion of cystic content. The imaging and operative findings described here highlight the unique characteristics of ongoing nonhemorrhagic cyst rupture. Recognizing nonhemorrhagic cyst rupture might prompt early surgical treatment in light of the natural history of the few aforementioned cases that revealed complications such as aseptic meningitis and hydrocephalus following the rupture.

We suggest that the unique characteristic of this colloid cyst is its origin in the septum pellucidum, which allowed it to progress in size without causing symptomatic hydrocephalus, as in the case of a typical colloid cyst originating from the roof of the third ventricle. Giant intraventricular colloid cysts (> 3 cm) are rare clinical entities, but frequently share pathoanatomical characteristics. Typically, colloid cysts originate from the anterior-inferior surface of the roof of the third ventricle, and their growth occurs anteriorly and inferiorly. Azab and colleagues examined their cases of third-ventricle colloid cysts and proposed that the architecture of the fornices, and specifically the point of fornical divergence, limit growth superiorly. Growth in the anterior-inferior direction quickly leads to obstruction of the foramen of Monro before cysts can obtain a giant size. Azab et al. propose that spontaneous rupture exhibited in the present case occurred because its suprafornical growth in the septum pellucidum asymptomatically progressed to a critical size where its walls ruptured. We speculate that spontaneous rupture is infrequently experienced because of the typical growth pattern of colloid cysts anterior-inferiorly, leading to hydrocephalus before the cyst can reach a critical size.

Spontaneous intraventricular rupture of a third-ventricle colloid cyst is a rare and previously undocumented phenomenon. In this report we describe striking imaging findings of cystic rupture with drainage of cyst contents into the occipital horns of the lateral ventricles, and confirmatory intraoperative microscopic imaging of the perforation in the cyst wall. We highlight the importance of recognizing cyst rupture on imaging in the setting of the expected consequences of a nonhemorrhagic rupture. This case supports the hypothesis that giant cysts more frequently arise when growth is suprafornical or within the septum pellucidum, unlike typical colloid cysts that grow anterior-inferiorly from the roof of the third ventricle. We speculate that this typical growth pattern leads to clinically significant hydrocephalus from obstruction of the foramen of Monro before cysts can obtain a giant size and rupture spontaneously.

References


**Disclosures**
The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

**Author Contributions**
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