

Colloid cyst of the third ventricle: a rare case of spontaneous regression. Illustrative case

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BACKGROUND Colloid cysts (CCs) are benign lesions commonly located in the third ventricle, near the foramen of Monro. They constitute about 0.5%–1% of all intracranial tumors. As benign lesions, CCs can be found incidentally, but they can also present with neurological deterioration and are even associated with sudden death, which might be explained as a result of obstructive hydrocephalus. Thus, larger and symptomatic CCs are often considered for surgery.

OBSERVATIONS The following case presents a rare and curious instance of a spontaneously regressing CC. This represents the 11th case ever reported about an extremely rare occurrence: the spontaneous regression of a previously diagnosed CC in the third ventricle.

LESSONS Carefully selected asymptomatic CCs can be monitored through regular imaging studies and neurological examinations. If regression of the cyst is observed, physicians should not be surprised, as this event, although rare, has been documented and published in 11 cases, including this one.

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KEYWORDS colloid cyst; regression; spontaneous; review; third ventricle

Colloid cysts (CCs), typically benign in nature, are most often found in the vicinity of the foramen of Monro, within the third ventricle.^{1,2} These cysts account for approximately 0.5%–1% of all brain tumors.² Although benign, these cysts can be detected by chance or can manifest through worsening neurological symptoms, and in some cases, they are linked to sudden death, potentially due to obstructive hydrocephalus.^{3–7} Symptomatic or large CCs can present with headaches and can be associated with nausea, vomiting, blurred vision, gait ataxia, and altered cognition.^{8–10} Due to their growth, CCs can obstruct the foramen of Monro and impede the circulation of cerebrospinal fluid (CSF), consecutively causing obstructive hydrocephalus. For this reason, symptomatic or large CCs are generally treated at the time of diagnosis. Surgery on this centrally located benign tumor has challenged neurosurgeons ever since Dandy successfully removed a CC in 1921.¹¹ It has been observed that surgical considerations for incidentally diagnosed CCs of the third ventricle vary widely among institutions, with operative intervention rates ranging between 0% and 57.1%.^{12–14} This disparity in management can be partially explained by variations in clinicians' judgments and experience, differences in institutional protocols, timing of evaluation, and, in general, a paucity

of robust literature on the natural history of these lesions. However, not all cysts require resection, since both the size and the location might not interfere with CSF flow. In asymptomatic patients with small, non-obstructive cysts, follow-up with serial neuroimaging is usually sufficient, as only a few cases demand neurosurgical intervention later on.

The following case is rare but must be remembered when surgical indications are discussed for CCs.

Illustrative Case

A 48-year-old male patient initially presented with a 12-month history of daily intermittent headaches and daily self-limiting visual blurriness in the morning hours. Magnetic resonance (MR) imaging revealed a cystic, sharp-edged lesion near the left foramen of Monro, appearing isointense on T1-weighted images and slightly hyperintense on T2-weighted images, without gadolinium enhancement. These findings were highly suggestive of a CC (Fig. 1). Considering that there was no sign of CSF flow obstruction, surgical intervention was deemed unnecessary, and the patient underwent a series of neuroimaging follow-ups (Fig. 2).

ABBREVIATIONS CC = colloid cyst; CCRS = CC risk score; CSF = cerebrospinal fluid; FLAIR = fluid-attenuated inversion recovery; MR = magnetic resonance.

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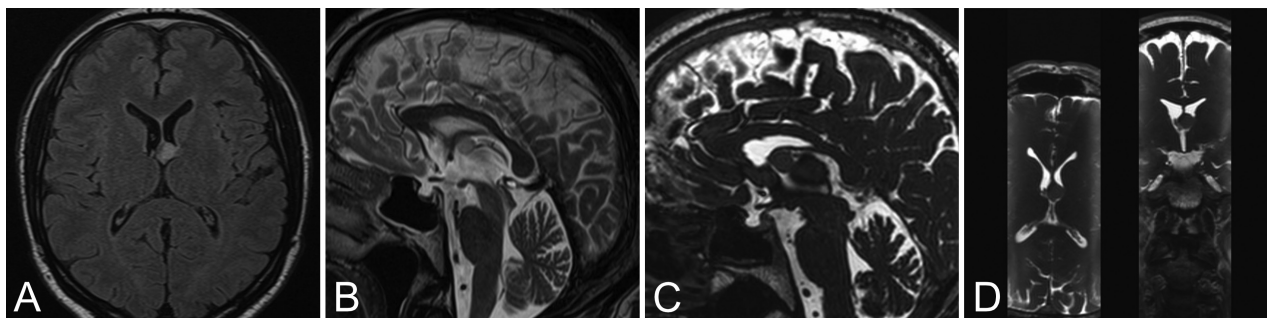


FIG. 1. Initial MR images obtained after the patient presented with symptoms and was referred to the neurosurgery team, revealing a hyperintense CC in the third ventricle near the foramen of Monro on FLAIR (A) and T2-weighted (B–D) sequences, without evidence of hydrocephalus.

Over 3 years, despite ongoing symptoms of recurring headaches and visual impairment not related to the cyst, follow-up MR imaging demonstrated no changes in the cyst's configuration nor any signs of CSF flow obstruction. Remarkably, after 4 years of regular follow-up, MR imaging revealed the disappearance of the cyst, with a small remnant, which was presumed to be a cyst wall, without the patient having undergone any treatment in the meantime (Fig. 3).

The headaches continued their intermittent pattern, and the patient did not report any other alterations or acute, temporary symptom deterioration. Another follow-up visit, 5 years later, with new MR images, again showed no signs of the previously observed cystic lesion, except for the presumed cyst wall (Fig. 4).

To our knowledge, this is the 11th reported case of such an extremely rare occurrence: the spontaneous regression of a previously diagnosed CC in the third ventricle.^{2,15–23}

Informed Consent

The necessary informed consent was obtained in this study.

Discussion

CCs are commonly located in the third ventricle, close to the foramen of Monro. Due to growth, they can obstruct the foramen, thereby

disrupting the circulation of CSF and consequently causing obstructive hydrocephalus, which can even lead to sudden death.^{16,24} Cases presenting with neurological deterioration, CSF flow obstruction, and consecutive hydrocephalus are often treated surgically, with cyst removal as the primary goal.

However, not all cysts necessitate resection, as their size and location might not interfere with CSF flow. Furthermore, as shown in our case and a few others, there is a possibility for the cyst to regress spontaneously.^{2,16,18–22} For that reason, the necessity of surgical removal of CCs with no symptoms or minimal symptoms remains debatable.

In today's digital era, wherein frequent and precise imaging techniques such as computed tomography scans and MR imaging are widely available, the detection of CCs has become more frequent and more accurate.^{8,9,25–27} With the increase in incidental findings of CCs, there has also been a rise in the number of studies exploring their natural history. The most common indications for imaging that lead to these incidental findings are usually trauma, followed by headaches as the second most common reason.²⁸ For incidental CCs deemed suitable for conservative management, there is a 5%–15% risk of future progression that may necessitate operative intervention within 5 years following diagnosis. The data presented support the need for ongoing neuroimaging surveillance of asymptomatic CCs.⁸

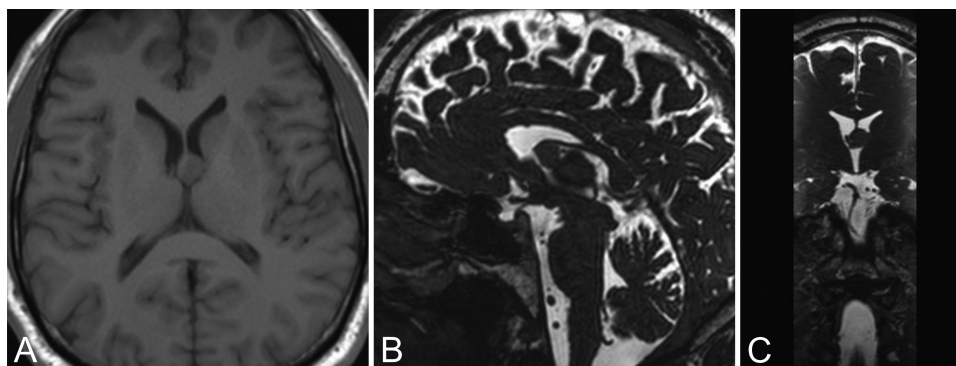


FIG. 2. First follow-up MR images obtained 1 year after initial imaging, demonstrating no changes in the cyst's configuration in all 3 planes (A–C). Over the next 3 years, despite persistent symptoms of recurring headaches and visual impairment unrelated to the cyst, subsequent MR imaging showed no progression; thus, no surgical intervention was indicated.

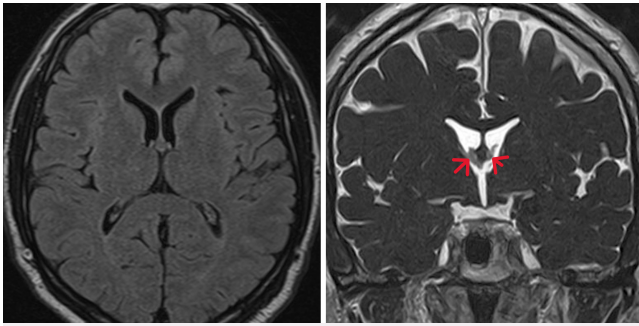


FIG. 3. First MR image (left) documenting regression of the CC. The FLAIR image (right) clearly does not show the hyperintense structure that had been followed for 4 years. A signal (red arrows) is visible, likely representing remnants of the cyst wall attached to the tela choroidea and choroid plexus, suggesting the theoretical possibility of a spontaneous rupture. However, it could also represent parts of the choroid plexus.

Regarding the underlying mechanism of regression, it is hypothesized to be due to a spontaneous release of cyst content by rupture, potentially leaving remnants such as a cystic wall behind. Motoyama et al. were the first to report the spontaneous regression of a CC, radiologically confirming it as a cyst rupture.²¹ The cyst might rupture at an unknown time, with its contents being absorbed into the ventricle, leaving only traces of the cyst wall in CCs with no or minimal symptoms.²

When analyzing all cases of spontaneous regression, it has been observed that in the reported cases, the cyst size was 30 mm or less, including our case. This observation naturally raises the question: could the small volume of the cyst wall be the reason why the CC does not appear on follow-up images?

A study has suggested predictors of a progression from asymptomatic to symptomatic CCs, such as younger age, increased cyst size, ventricular dilatation, and increased signal on T2-weighted MR imaging.²⁹

It is noteworthy that Zeineddine et al. proposed a CC risk score (CCRS) to guide the treatment of CCs.²⁸ They identified the following indicators as risk factors: age younger than 65 years, having a cyst of at least 7 mm in length, an anterior location, high signal intensity on fluid-attenuated inversion recovery (FLAIR)/T2 images, and lesion-related

headaches. If the CCRS totals at least 3 points, asymptomatic cases are considered high risk for causing obstructive hydrocephalus. Of the 11 reported cases of CC with spontaneous regression, 5 cases were classified as medium risk, 3 cases as low risk, and 3 cases, including our case, as high-risk (Table 1).

However, predicting the worsening of patients with CCs based on the natural course of asymptomatic cases, as well as understanding the actual reasons and mechanisms behind cyst resolution, remains unclear and is yet to be defined by future studies.

Observations

Compared to other published case reports, our case, as well as the one detailed by Mulcahy et al., provides the lengthiest follow-up period of 9 years.¹⁵ Notably, our case, similar to the case of Mulcahy et al., exhibits a small remnant of the cyst wall.¹⁵ However, the MR imaging signal that we interpret as the cyst wall remnant might represent parts of the choroid plexus. Given the low probability of a cyst wall spontaneously resolving rather than remaining attached to the tela choroidea, we interpret the signal as a remnant of the cyst wall (see Figs. 3 and 4). Additionally, it is worth highlighting that, when comparing the 2 cases, the one we present demonstrates a higher CCRS.

Considering the data presented and reviewed, the following questions emerge: if a spontaneous rupture serves as the pathohistological mechanism behind cyst regression, is there a potential for the ruptured cyst to refill, re-emerge, and lead to complications? If this is the case, what is the recommended duration for a physician to conduct radiological follow-ups on an asymptomatic patient with a previously regressed CC?

To date, there are no reported cases of a CC reappearing after regression. Noninvasive follow-up imaging, such as MR imaging, can prove valuable for academic purposes, providing further insights into the natural history of these intriguing CCs that mysteriously disappear.

Lessons

In summary, resection is the primary intervention for both symptomatic and asymptomatic large CCs, especially when the cyst is associated with hydrocephalus. However, spontaneous regression can occur in some cases without treatment. Consequently, carefully selected asymptomatic CCs can be monitored through regular imaging studies and neurological examinations. If regression of the cyst is observed, physicians should not be surprised, as this event, although rare, has been documented and published in 11 cases, including this one.

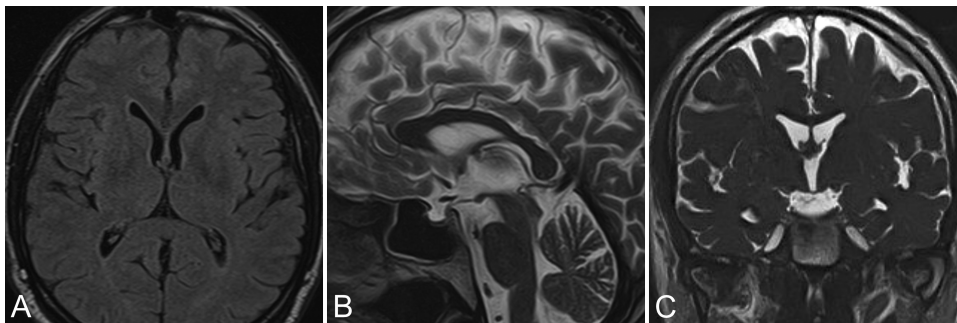


FIG. 4. Last control MR images and the last imaging study performed to date. The same signal, presumed to be remnants of the cyst wall of the CC, can be observed in the axial (A), sagittal (B), and coronal (C) planes. The patient is scheduled for another control imaging appointment in 4 years.

TABLE 1. Literature review of cases with spontaneous resolution of a CC

Authors & Year	Age (yrs)	Sex	Symptoms	Symptom Duration	Initial Size (mm)	Duration to Regression	Size at Last FU	FU Duration	CCRS*
Motoyama et al., 2002 ²¹	83	F	Gait disturbance, urinary incontinence, & dementia	2 mos	NA	10 days	Small remnant	8 mos	0+1+1+0+0=2
Annamalai et al., 2008 ²	35	M	Incidentally detected	NA	5	15 mos	Disappeared	18 mos	1+0+0+0+0=1
Gbejuade et al., 2011 ¹⁶	65	M	Headache, lassitude, & forgetfulness	4 yrs	8	19 mos	Disappeared	19 mos	0+1+1+0+1=3
Peeters et al., 2016 ¹⁸	46	F	Headache, altered mental status, & amnesia	NA	2.852†	5 mos	0.07 cm ³	1 yr	1+1+0+0+1=3
Turei et al., 2017 ²⁰	45	F	Headache & dizziness	6 mos	11	2 yrs	Disappeared	2 yrs	1+1+1+1+1=5
Mulcahy et al., 2020 ¹⁵	51	M	Incidentally detected	NA	18	4 yrs	Small remnant	9 yrs	1+1+1+0+0=3
Magalhães-Ribeiro et al., 2020 ¹⁷	57	F	Intermittent scotoma	3 mos	10	51 mos	Disappeared	75 mos	1+1+1+0+0=3
Menéndez-Cortezón et al., 2020 ²²	2.5	F	Incidentally detected	NA	30	6 yrs	5 mm	60 mos	1+1+1+1+0=4
Cosgrove et al., 2020 ¹⁹	67	M	Dizziness, lt leg paresthesia, & gait abnormalities	1 day	5	4 yrs	3 mm	NA	0+0+0+NA+0=0 or 1
Lee et al., 2022 ²³	49	M	Incidentally detected	NA	12	18 mos	4 mm	30 mos	1+1+0+1+0=3
Present case	48	M	Headache & visual blurriness	12 mos	9	4 yrs	Small remnant	9 yrs	0+1+1+1+1=4

FU= follow-up; NA= not available.

* CCRS: 1 point for each variable; age < 65 years, diameter ≥ 7 mm, anterior location, high signal intensity on FLAIR/T2-weighted image, headache. CCRS 0, 1, 2: low risk; CCRS 3 without hydrocephalus: intermediate risk; CCRS 3 with hydrocephalus and CCRS 4, 5: high risk.

† Expressed in cm³.

References

1. Abernathy CD, Davis DH, Kelly PJ. Treatment of colloid cysts of the third ventricle by stereotaxic microsurgical laser craniotomy. *J Neurosurg*. 1989;70(4):525-529.
2. Annamalai G, Lindsay KW, Bhattacharya JJ. Spontaneous resolution of a colloid cyst of the third ventricle. *Br J Radiol*. 2008; 81(961):e20-e22.
3. Büttner A, Winkler PA, Eisenmenger W, Weis S. Colloid cysts of the third ventricle with fatal outcome: a report of two cases and review of the literature. *Int J Legal Med*. 1997;110(5):260-266.
4. de Witt Hamer PC, Versteegen MJ, De Haan RJ, et al. High risk of acute deterioration in patients harboring symptomatic colloid cysts of the third ventricle. *J Neurosurg*. 2002;96(6):1041-1045.
5. Humphries RL, Stone CK, Bowers RC. Colloid cyst: a case report and literature review of a rare but deadly condition. *J Emerg Med*. 2011;40(1):e5-e9.
6. Ryder JW, Kleinschmidt-DeMasters BK, Keller TS. Sudden deterioration and death in patients with benign tumors of the third ventricle area. *J Neurosurg*. 1986;64(2):216-223.
7. Demirci S, Dogan KH, Erkol Z, Gulmen MK. Sudden death due to a colloid cyst of the third ventricle: report of three cases with a special sign at autopsy. *Forensic Sci Int*. 2009;189(1-3):e33-e36.
8. O'Neill AH, Gragnaniello C, Lai LT. Natural history of incidental colloid cysts of the third ventricle: a systematic review. *J Clin Neurosci*. 2018;53:122-126.
9. Cetinalp E, Ildan F, Boyar B, Bagdatoglu H, Uzuneyüpoğlu Z, Karadayi A. Colloid cysts of the third ventricle. *Neurosurg Rev*. 1994; 17(2):135-139.
10. Kaye AH. *Essential Neurosurgery*. 3rd ed. Wiley; 2005.
11. Dandy WE. Benign tumors in the third ventricle of the brain. *Am J Med Sci*. 1934;187(4):566.
12. Kondziolka D, Lunsford LD. Microsurgical resection of colloid cysts using a stereotactic transventricular approach. *Surg Neurol*. 1996; 46(5):485-492.
13. Mathiesen T, Grane P, Lindgren L, Lindquist C. Third ventricle colloid cysts: a consecutive 12-year series. *J Neurosurg*. 1997;86(1): 5-12.
14. Desai KI, Nadkarni TD, Muzumdar DP, Goel AH. Surgical management of colloid cyst of the third ventricle—a study of 105 cases. *Surg Neurol*. 2002;57(5):295-304.
15. Mulcahy MJ, Chaganti J, Al-Khawaja D. The case of the disappearing colloid cyst. *World Neurosurg*. 2020;135:100-102.
16. Gbejuade H, Plaha P, Porter D. Spontaneous regression of a third ventricle colloid cyst. *Br J Neurosurg*. 2011;25(5):655-657.
17. Magalhães-Ribeiro C, Mascarenhas L, Santos RB, Resende M. Spontaneous asymptomatic resolution of a third ventricle colloid cyst. *Neurochirurgie*. 2020;66(2):137-138.
18. Peeters SM, Daou B, Jabbour P, Ladoux A, Abi Lahoud G. Spontaneous regression of a third ventricle colloid cyst. *World Neurosurg*. 2016;90:704.e19-704.e22.
19. Cosgrove ME, Saadon J, Chesler DA. Colloid cyst curtailed: a case report of spontaneous colloid cyst regression. *Surg Neurol Int*. 2020;11:465.
20. Turel MK, Kucharczyk W, Gentili F. Spontaneous resolution of colloid cyst of the third ventricle: implications for management. *Asian J Neurosurg*. 2017;12(2):203-206.
21. Motoyama Y, Hashimoto H, Ishida Y, Iida JI. Spontaneous rupture of a presumed colloid cyst of the third ventricle—case report. *Neurol Med Chir (Tokyo)*. 2002;42(5):228-231.
22. Menéndez-Cortezón B, López-García E, Román-Pena P, Gelabert-González M. Regresión espontánea de quiste coloidal de tercer ventrículo en paciente pediátrica. *Neurocirugía*. 2021;32(4): 199-202.
23. Lee JH, Hong JH, Kim YJ, Moon KS. Spontaneous regression of colloid cyst on the third ventricle: a case report with the review of the literature. *BMC Neurol*. 2022;22(1):397.
24. Joshi SM, Gnanalingham KK, Mohaghegh P, Wilson A, Elsmore A. A case of familial third ventricular colloid cyst. *Emerg Med J*. 2005; 22(12):909-910.
25. Bullard DE, Osborne D, Cook WA Jr. Colloid cyst of the third ventricle presenting as a ring-enhancing lesion on computed tomography. *Neurosurgery*. 1982;11(6):790-791.
26. Ganti SR, Antunes JL, Louis KM, Hilal SK. Computed tomography in the diagnosis of colloid cysts of the third ventricle. *Radiology*. 1981;138(2):385-391.
27. Hernesniemi J, Leivo S. Management outcome in third ventricular colloid cysts in a defined population: a series of 40 patients treated mainly by transcallosal microsurgery. *Surg Neurol*. 1996;45(1):2-14.
28. Zeineddine HA, Westmark K, Khanpara S, et al. Risk analysis and management of third ventricular colloid cysts. *World Neurosurg*. 2021;146:e1071-e1078.
29. Pollock BE, Schreiner SA, Huston J III. A theory on the natural history of colloid cysts of the third ventricle. *Neurosurgery*. 2000;46(5): 1077-1083.

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

Conception and design: Todorovic, Baldauf. Acquisition of data: Weidemeier. Analysis and interpretation of data: Todorovic. Drafting the article: Todorovic. Critically revising the article: all authors. Reviewed submitted version of manuscript: Weidemeier, Todorovic. Approved the final version of the manuscript on behalf of all authors: Weidemeier. Administrative/technical/material support: Weidemeier, Todorovic, Schroeder. Study supervision: Schroeder, Baldauf.

Supplemental Information

Previous Presentations

This work was presented as an e-poster at the 71st Annual Meeting of the German Society for Neurosurgery (DGNC) and 8th Joint Meeting with the Japanese Neurological Society, a digital conference, June 21–24, 2020.

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