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Accidental Total Resection of a Colloid Cyst by a Stereotactic Biopsy Needle: A Case Report

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Abstract

Stereotactic aspiration of a third ventricular colloid cyst is intended to empty the cyst, not to remove its wall. We report an unusual event in which the entire cyst wall was extracted during this procedure. A 14-year-old girl presented with a six-month history of intermittent headaches, nausea, and short-term memory difficulties, and fundoscopy showed papilledema. Magnetic resonance imaging (MRI) revealed a 9 mm cyst at the anterior roof of the third ventricle with mild enlargement of the lateral ventricles. Frame-based stereotactic aspiration was carried out through a right frontal burr hole using a 2.1 mm Sedan side-cutting needle. After the viscous contents had been evacuated, resistance was felt during withdrawal of the needle, and the whole capsule was found caught in its side window. Postoperative MRI showed no residual cyst and normal ventricular size, and histology confirmed the diagnosis. The patient remained free of symptoms at 18 months. We are not aware of any previous description of this mechanism. Because it occurred by chance and an attempt to reproduce it could damage nearby deep structures, it should not be considered a technique; excision of the capsule under direct vision remains the preferred definitive treatment.

Categories: Emergency Medicine, Pediatric Surgery, Neurosurgery
Keywords: colloid cyst, minimally invasive surgery, pediatric hydrocephalus, stereotactic biopsy, total resection

Introduction

Colloid cysts are rare, histologically benign lesions located almost exclusively at the anterior roof of the third ventricle, close to the foramen of Monro, through which cerebrospinal fluid (CSF) flows from the lateral ventricles into the third ventricle [1,2]. By obstructing this channel, they can cause hydrocephalus, sometimes abruptly: in a large series, 12.3% of symptomatic patients presented acutely, and the risk of death was 3.1% [1]. Surgery in this region is delicate because of the close relationship with the fornices and the internal cerebral and thalamostriate veins.

Treatment options include stereotactic aspiration, endoscopic removal, and microsurgical excision [3]. Aspiration is the least invasive but usually leaves the capsule in place [3,4]; in a long-term series, symptomatic recurrence occurred in five of six patients after partial aspiration and in four of 17 after complete aspiration [3]. It is generally performed with side-cutting biopsy needles, such as the Sedan needle, whose lateral window is designed for tissue sampling, not for removing the cyst wall. Endoscopic and microsurgical techniques remove the capsule and reduce recurrence, but they are more demanding and carry their own risks [5].

We report the unexpected removal of the entire cyst wall, in a single piece, within the side window of a Sedan needle during stereotactic aspiration. A search of PubMed, Scopus, and Google Scholar from inception to October 2026, using the terms “colloid cyst,” “stereotactic,” “aspiration,” “capsule,” and “total removal,” identified no previous description of this mechanism.

Case Presentation

A 14-year-old girl was referred to our department after six months of intermittent bifrontal headaches with episodes of nausea and short-term memory difficulties. Neurological examination was normal except for mild cognitive slowing, and fundoscopy showed grade 2 papilledema.

Brain magnetic resonance imaging (MRI) revealed a well-defined 9 mm lesion at the anterior roof of the third ventricle. The lesion was hyperintense on T2-weighted images and showed thin peripheral enhancement after gadolinium injection, and the lateral ventricles were mildly dilated. These features were consistent with a colloid cyst (Figure *1*).

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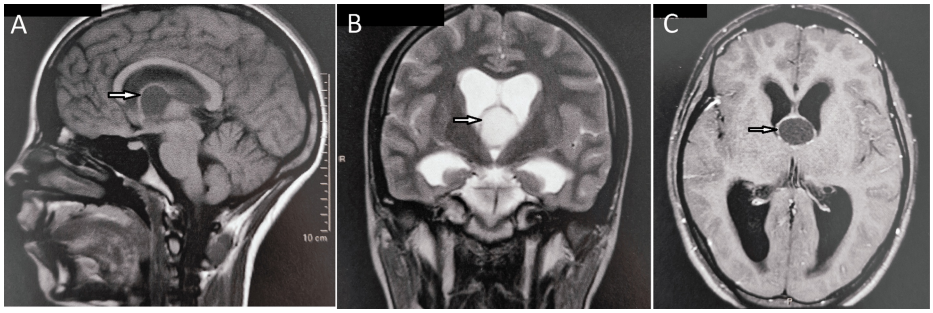


FIGURE 1: Preoperative brain MRI.

(A) Sagittal T1-weighted image, (B) coronal T2-weighted image, and (C) axial contrast-enhanced T1-weighted image showing a well-circumscribed 9 mm colloid cyst at the anterior roof of the third ventricle, at the level of the foramen of Monro (arrows). Mild dilatation of the lateral ventricles is also visible.

MRI, magnetic resonance imaging.

The therapeutic options were explained to the patient's parents, and stereotactic aspiration was selected after their informed consent had been obtained. With a Leksell stereotactic frame in place, a right frontal burr hole was made, and a 2.1 mm Sedan side-cutting biopsy needle was advanced into the cyst. Thick colloid material was aspirated through the needle. During withdrawal of the cannula, the surgeon felt resistance. Once the needle had been removed, the entire cyst capsule was found lodged in its lateral cutting window, having been extracted as a single piece (Figure *2*).

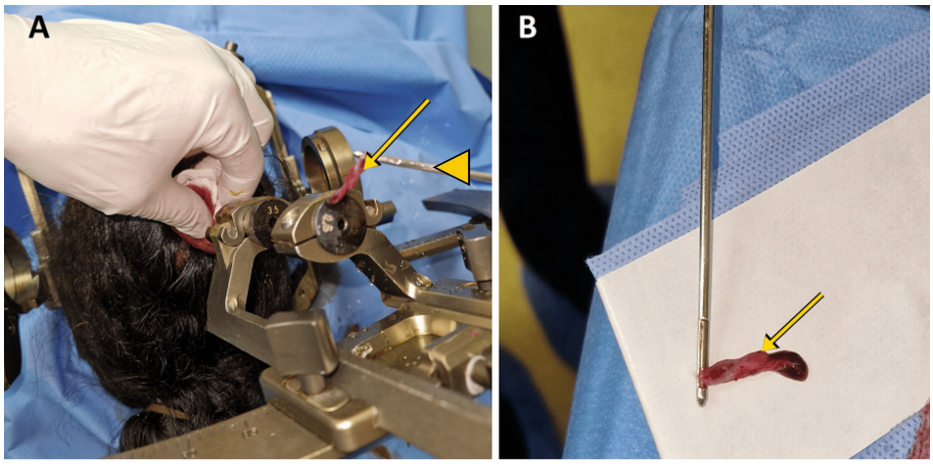


FIGURE 2: Intraoperative photographs.

(A) Withdrawal of the Sedan side-cutting biopsy needle (arrowhead) through the Leksell stereotactic frame; the cyst capsule is seen emerging attached to the needle (arrow). (B) Needle after complete withdrawal, showing the entire cyst capsule trapped in its lateral cutting window and extracted in a single piece (arrow).

The patient recovered without complications or new neurological deficits and was discharged on the third postoperative day. Postoperative MRI showed complete disappearance of the cyst and a return of the ventricles to normal size (Figure *3*).

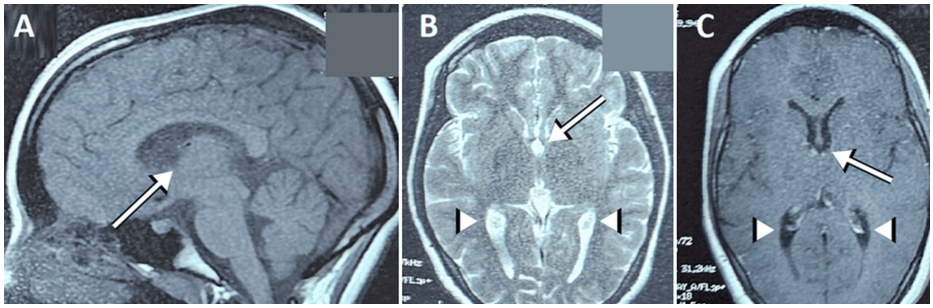


FIGURE 3: Postoperative brain MRI.

(A) Sagittal T1-weighted image, (B) axial T2-weighted image, and (C) axial contrast-enhanced T1-weighted image showing complete disappearance of the cyst at the anterior roof of the third ventricle, with no residual lesion (arrows). The arrowheads in (B) and (C) indicate the lateral ventricles, which have returned to normal size.

MRI, magnetic resonance imaging.

Histopathological examination of the specimen showed a thin-walled cyst lined by pseudostratified columnar epithelium containing mucin-secreting cells and filled with amorphous eosinophilic colloid material, confirming the diagnosis of a colloid cyst (Figure 4). The patient was seen in clinic at three, 12, and 18 months after surgery; at each visit she was free of symptoms, and her neurological examination was normal.

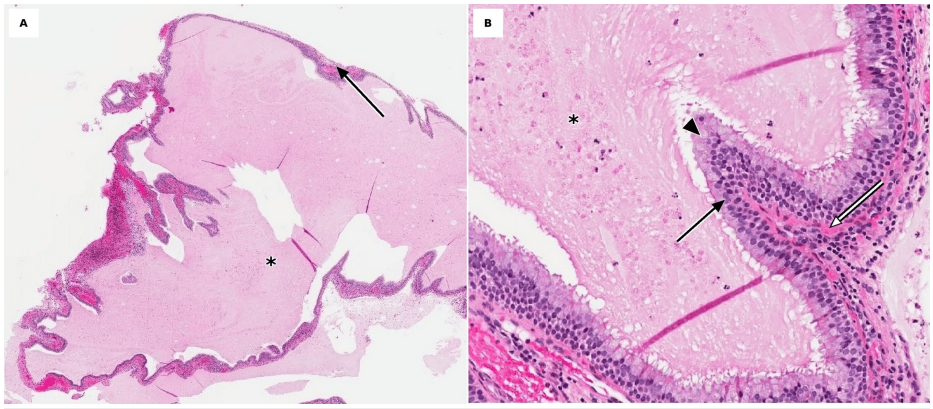


FIGURE 4: Histopathological examination of the resected cyst wall.

(A) Low-power view showing a thin-walled cystic lesion lined by epithelium (arrow) and filled with abundant amorphous, eosinophilic colloid material (asterisk) (hematoxylin and eosin, original magnification ×50). (B) Higher-power view showing a pseudostratified columnar lining (black arrow) containing cells with clear apical cytoplasm of mucin-secreting appearance (arrowhead), resting on a thin fibroconnective wall (white arrow), with eosinophilic luminal content (asterisk) (hematoxylin and eosin, original magnification ×200).

Discussion

Colloid cysts are slow-growing lesions that usually originate in the anterior roof of the third ventricle, where they may disturb CSF flow. Although many never cause symptoms, symptomatic cysts expose patients to sudden neurological deterioration and death from acute hydrocephalus [1,2]. Several radiological characteristics have been linked to the development of obstructive hydrocephalus, including a diameter of 7 mm or more, a volume of 180 mm^3 or more, an increased Evans ratio, and high signal on T2-weighted or fluid-attenuated inversion recovery (FLAIR) images [1]. In our patient, the cyst was larger than this diameter threshold and was accompanied by ventricular enlargement and papilledema, which together justified surgical treatment.

MRI is the preferred imaging modality. Colloid cysts typically appear as round, non-enhancing lesions in the anterior third ventricle, although a thin rim of capsular enhancement may be seen after contrast administration [6].

Management depends on the clinical presentation and imaging findings. Incidental cysts smaller than 7 mm without ventricular enlargement are usually monitored with repeat imaging, whereas symptomatic cysts

require surgery, combined with temporary external ventricular drainage when acute hydrocephalus is present [1,2].

Stereotactic aspiration gained popularity in the late 20th century as a less invasive alternative to open surgery [3,4]. Although it effectively decompresses the cyst, the capsule usually remains, and a considerable proportion of patients experience recurrence, particularly when aspiration has been incomplete. In one long-term series, most partially aspirated cysts and about one quarter of completely aspirated cysts recurred symptomatically [3]. Radiosurgery after aspiration has been suggested as a way to lower this risk [4].

Endoscopic resection allows the capsule to be removed through a narrow corridor [5], while microsurgical transcallosal or transcortical approaches achieve high rates of complete excision at the cost of greater manipulation of brain tissue [7]. Each technique has specific complications; isolated entrapment of a lateral ventricle, for instance, has been reported after endoscopic resection [8].

In our case, complete removal resulted from an unplanned interaction between the cyst wall and the instrument. The Sedan needle has a side window designed to draw tissue in for sampling. We hypothesize that the suction applied during aspiration drew the collapsed, thin capsule into this window and that withdrawal of the needle then detached the capsule from its attachments, so that it was removed in one piece. The small size of the cyst and the thinness of its wall probably favored this outcome, and a loose attachment to the roof of the third ventricle may explain why no bleeding occurred.

Despite the excellent result, we do not recommend attempting to reproduce this maneuver. The needle is not designed to dissect the cyst wall, and blind traction on a capsule that adheres to the roof of the third ventricle could tear the thalamostriate or internal cerebral veins, injure the fornix, or cause intraventricular hemorrhage. In a different patient, the same resistance during withdrawal might indicate a capsule firmly attached to deep structures, and further traction could be harmful. Surgeons who perform stereotactic aspiration should therefore interpret unexpected resistance as a warning sign rather than as an opportunity.

This report has limitations. It describes a single patient, and the 18-month clinical follow-up, although reassuring, is short compared with the delayed recurrences reported after aspiration [3]. Longer imaging surveillance would be advisable.

Conclusions

We describe complete, en bloc removal of a third ventricular colloid cyst that occurred unintentionally during stereotactic aspiration, when the capsule became trapped in the side window of a Sedan biopsy needle. The patient recovered fully and remained free of symptoms throughout 18 months of clinical follow-up. In our opinion, this result was fortuitous and should not be regarded as a reproducible technique, because the instrument is not designed to dissect the capsule and uncontrolled traction close to deep venous structures may be dangerous. This case shows that a stereotactic needle can interact with the cyst wall in ways that are not anticipated during planning. The main practical message we draw from it is not that capsule removal by aspiration is feasible, but that unexpected resistance during needle withdrawal should lead the surgeon to stop, reassess, and avoid further traction. When definitive removal of the capsule is the goal, we continue to favor endoscopic or microsurgical excision, and we believe that patients treated by aspiration should remain under long-term imaging surveillance. We hope that sharing this experience will help other surgeons recognize and safely manage a similar situation.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Jawad Laaguili, Cherkaoui Mandour, Abad Cherif El Asri, Miloudi Gazzaz

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Supervision: Cherkaoui Mandour, Abad Cherif El Asri, Miloudi Gazzaz

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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