Case Report

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Colloid Cyst of the Posterior Fossa: A Case Report and Review of the Literature

Posterior Fossa Kolloid Kisti: Olgu Sunumu ve Literatür Taraması

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ABSTRACT

Colloid (neuroepithelial) cysts are slow-growing, benign, potentially fatal lesions that account for less than 2% of all intracranial tumors. They are most commonly located in the third ventricle, however may be seen along the entire neural axis. A 39-year-old woman presented with a one-year history of increasingly frequent headaches. She had no neurological signs. On magnetic resonance imaging, a cystic mass was observed in the left cerebellum (24×21×20 mm) compressing the fourth ventricle and brainstem. The cystic mass was totally excised, and histopathology confirmed a colloid cyst. The patient was discharged with no neurological deficit. Colloid cysts are very rare in the posterior fossa. The most common symptom is headache. Its origin is not known exactly, but it is thought to develop as a result of abnormal folding of the primitive neuroepithelium. Total excision of colloid cysts is curative.

Keywords: Colloid cyst, neuroepithelial cyst, posterior fossa

ÖZ

Kolloid (nöroepitel) kistler, tüm intrakranial tümörlerin %2'sinden daha azını oluşturan, yavaş büyüyen, iyi huylu, potansiyel olarak ölümcül lezyonlardır. En sık üçüncü ventrikülde yerleşirler, ancak tüm nöral aks boyunca görülebilirler. Otuz dokuz yaşında bir kadın, bir yıldır giderek sıklaşan baş ağrısı öyküsü ile başvurdu. Nörolojik belirtisi yoktu. Manyetik rezonans görüntülemede, sol serebellumda (24×21×20 mm) dördüncü ventrikülü ve beyin sapını sıkıştıran kistik bir kitle görüldü. Kistik kitle tamamen çıkarıldı ve histopatoloji kolloid kisti doğruladı. Hasta nörolojik defisit olmadan taburcu edildi. Kolloid kistler posterior fossada çok nadir görülür. En sık görülen semptom baş ağrısıdır. Kökeni tam olarak bilinmemektedir, ancak ilkel nöroepitelyumun anormal katlanması sonucu geliştiği düşünülmektedir. Kolloid kistlerin total eksizyonu küratiftir.

Anahtar Kelimeler: Kolloid kist, nöroepitelyal kist, posterior fossa

Introduction

Colloid (neuroepithelial) cysts are slow-growing, benign lesions that account for less than 2% of all intracranial tumors, yet they can be potentially fatal (1,2). They are typically located within the third ventricle, near the foramen of Monro. However, on rare occasions, they can be found along the entire neural axis (3-7). A posterior fossa location is exceptionally rare, and this atypical localization presents both diagnostic and therapeutic challenges. While third ventricle cysts typically present with obstructive hydrocephalus and related symptoms (headache, changes in consciousness, seizures, nausea, dizziness, and even sudden death) (2,8,9), cysts in the posterior fossa are more likely to manifest with clinical signs of brainstem and cerebellar compression. Therefore, when a cystic lesion is detected in the posterior fossa, the differential diagnosis is broad, and advanced neuroimaging methods play a critical role in reaching an accurate diagnosis. Specifically,

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multi-parametric magnetic resonance imaging (MRI) is the cornerstone for characterizing the lesion, establishing the surgical indication, and determining the treatment strategy. In this case report, we present a rare case of a colloid cyst located in the posterior fossa, aiming to discuss the diagnostic nuances, treatment management, and particularly the importance of specific imaging modalities in the decision-making process, supported by a literature review.

Case Report

A 39-year-old woman presented with a one-year history of progressively worsening headaches. Her neurological examination revealed no focal neurological deficits, and a funduscopic examination confirmed the absence of papilledema. MRI of the brain revealed a 24×21×20 mm cystic mass in the left cerebellum, compressing the fourth ventricle and brainstem. The lesion appeared hypointense on T1-weighted images and hyperintense on T2-weighted images. The signal characteristics of colloid cysts can vary depending on the cyst's contents, such as protein, mucin, or blood products, and their viscosity, which can lead to appearances different from the typical T1 hyperintensity. The lesion was hyperintense on fluid-attenuated inversion recovery (FLAIR) sequences, and diffusion-weighted imaging (DWI) with the corresponding apparent diffusion coefficient (ADC) map showed no diffusion restriction. No contrast enhancement was observed (Figure 1). The patient underwent a suboccipital craniotomy. The intraoperative appearance of the lesion was consistent with the preoperative MRI findings. The thin-walled cystic mass was excised using microsurgical techniques via a transvermian approach. This approach was chosen due to the cyst's superior extension and its relationship to the midline, providing a direct surgical corridor while

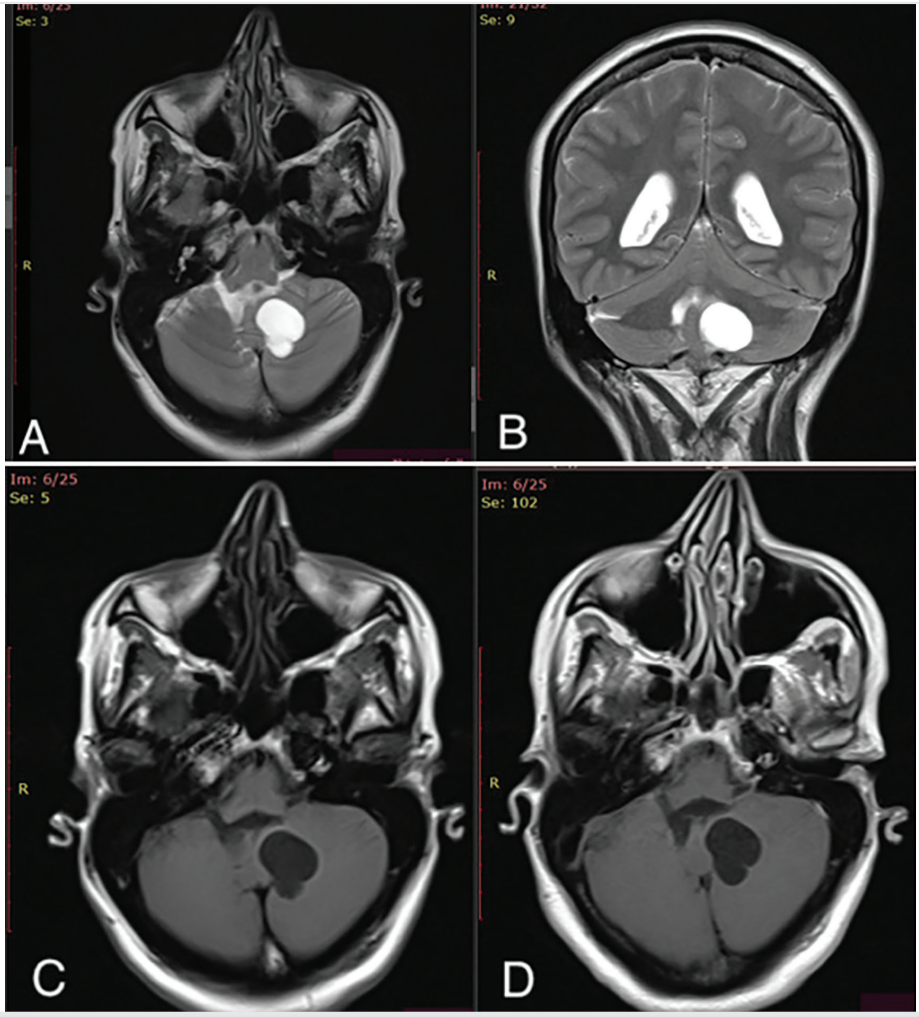

Figure 1. MRI revealing a well-defined cystic lesion in the left cerebellum. (A) Axial T2-weighted image and (B) coronal T2-weighted image demonstrate a hyperintense cystic measuring 24×21×20 mm. (C) Axial T1-weighted image shows the lesion as hypointense, and (D) axial contrast-enhanced T1-weighted image shows no enhancement of the cyst. The lesion causes compression of the fourth ventricle and brainstem

MRI: Magnetic resonance imaging

respecting the surrounding venous anatomy. The telovelar approach is also a reasonable alternative for accessing the fourth ventricle, particularly for more inferiorly located lesions, as it spares the vermis. The patient recovered well postoperatively and was discharged without any neurological deficits. Histopathological examination confirmed the lesion was a colloid cyst. Microscopic examination revealed benign epithelial fragments within the cerebellar tissue. The cyst lining consisted of an epithelial layer that was composed of partly a single layer of flat or cuboidal cells and partly low columnar cells. Immunohistochemical staining showed that the epithelial component was positive for epithelial membrane antigen (EMA) and pancytokeratin, while it was negative for glial fibrillary acidic protein (GFAP) and S-100. The surrounding cerebellar parenchyma was positive for GFAP and S-100 (Figure 2). Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

Discussion

Colloid (neuroepithelial) cysts are slow-growing, benign, yet potentially fatal lesions, accounting for less than 2% of all intracranial tumors (1,2). Although they are most commonly located in the third ventricle, they can be seen along the entire neural axis (3-7). They are exceedingly rare in the posterior fossa (5). The most common symptom is headache. Other reported symptoms include gait disturbance, loss of consciousness, nausea

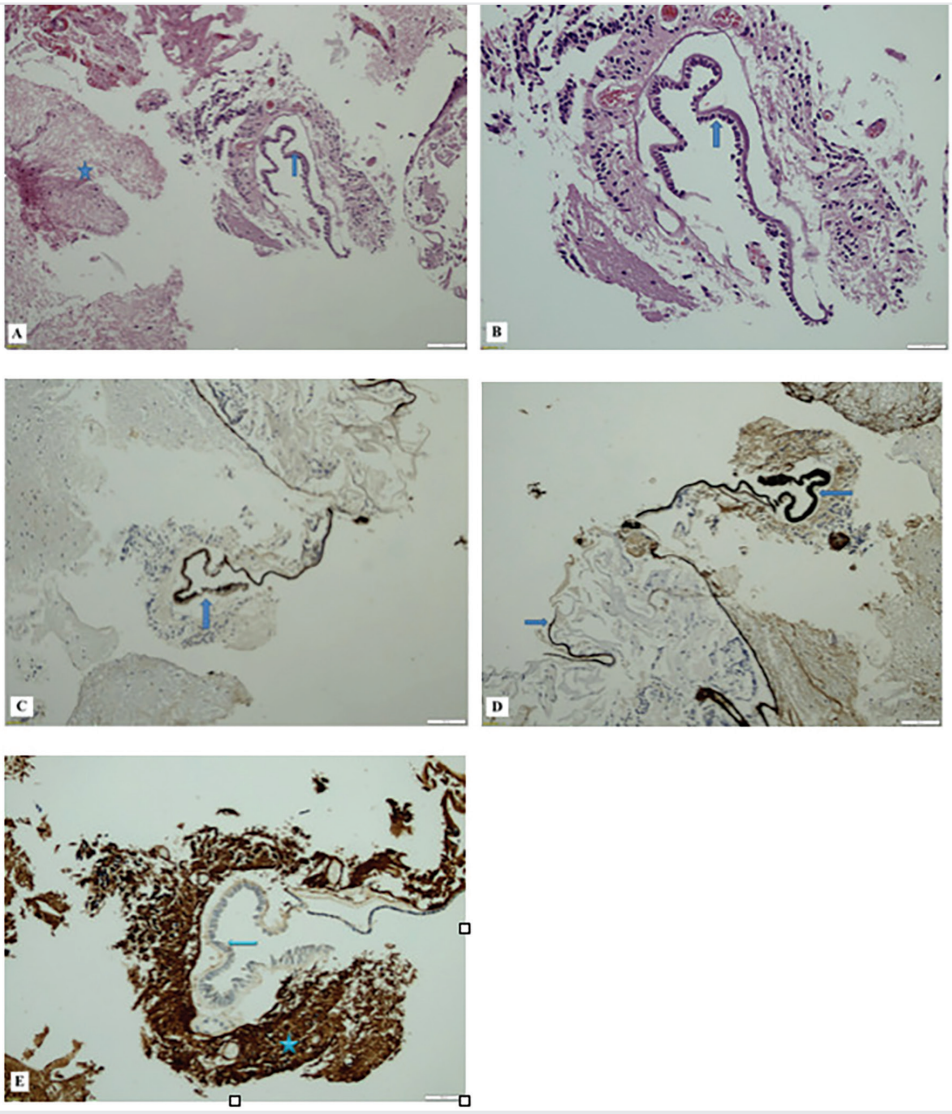

Figure 2. Histopathological images of the resected colloid cyst and surrounding cerebellar tissue. (A and B) H&E-stained sections showing a cyst wall fragment with a single layer of epithelial cells (arrow) adjacent to cerebellar parenchyma (star). (C and D) Immunohistochemical staining for epithelial markers shows strong positivity for EMA and pancytokeratin in the cyst's epithelial lining (arrows). (E) GFAP staining is positive in the surrounding cerebellar tissue (star) but negative in the cyst epithelium (arrow)

EMA: Epithelial membrane antigen, GFAP: Glial fibrillary acidic protein, H&E: Hematoxylin and eosin

and vomiting, visual disturbances, urinary incontinence, dizziness, seizures, and diplopia. Despite being benign, they can cause acute hydrocephalus and sudden death (10). The most common clinical finding is papilledema (11).

The exact origin of colloid cysts is unknown, but they are thought to develop from an abnormal folding of the primitive neuroepithelium. The cyst contents typically include mucin, hemosiderin, cholesterol, and various ions (12). Histologically, colloid cysts (also known as neuroepithelial cysts) consist of an outer fibrous capsule and an inner single layer of squamous, cuboidal, or low columnar epithelium (6). They typically show positive staining with periodic acid-Schiff, EMA, and cytokeratin, and they are negative for GFAP and S-100 (3).

The Role of Imaging Modalities in Diagnosis and Treatment Decisions

In addition to clinical findings, advanced neuroradiological examinations played a critical role in making the surgical treatment decision and in preoperative planning. The multi-parametric MRI sequences used in our case were fundamental in understanding the nature of the lesion and narrowing the differential diagnosis. The lesion's hypointense appearance on T1-weighted series and hyperintense appearance on T2-weighted series, while different from the typical T1 hyperintense signal of classic third ventricle colloid cysts, confirms that signal characteristics can be variable depending on the protein and mucin concentration of the cyst contents. The hyperintensity of the lesion on the fluid-attenuated FLAIR sequence confirmed that the cyst content was different from cerebrospinal fluid (CSF), ruling out lesions with the same signal intensity as CSF, such as an arachnoid cyst. The absence of diffusion restriction on DWI and the ADC map, one of the most critical sequences, allowed us to exclude an epidermoid cyst, which is one of the most important differential diagnoses in this region and typically shows marked diffusion restriction. Finally, the lack of any contrast enhancement in the lesion on post-contrast series was interpreted against cystic neoplasms such as hemangioblastoma, pilocytic astrocytoma, or ependymoma, which typically show enhancement in a mural nodule or solid components. This multi-parametric MRI approach revealed the benign, non-neoplastic cystic nature of the lesion, which, combined with its compression of the brainstem and fourth ventricle, finalized the indication for surgical excision.

Differential Diagnosis and Surgical Management

The differential diagnosis for a cystic lesion in the posterior fossa is broad. It includes epidermoid and dermoid cysts, which typically demonstrate diffusion restriction; arachnoid cysts, which follow CSF signal on all sequences; and rare neurenteric cysts, which are often located ventral to the brainstem. Furthermore, cystic tumors such as hemangioblastoma, pilocytic astrocytoma, and ependymoma should also be considered, though these were ruled out in our case by the absence of an enhancing mural nodule or solid component (9).

To our knowledge, five cases of colloid cysts in the posterior fossa were previously reported in the literature (4-6,13). The mean age of all six cases (including the present case) was 39.6 years. All cases presented with headache. All cases showed compression of the brainstem and fourth ventricle, and all were treated surgically. In all patients, including our own, the preoperative neurological symptoms improved after treatment. The details of the previously reported posterior fossa colloid cyst cases are summarized in Table 1.

There is no consensus on the management of colloid cysts. Symptomatic colloid cysts are best treated with surgical excision. The management of incidental, asymptomatic, or non-hydrocephalic colloid cysts is controversial. It should be kept in mind that colloid cysts may cause acute hydrocephalus and therefore require urgent shunting. Complete surgical excision of colloid cysts is curative, and recurrence is rare (14).

Conclusion

Although rare, colloid cysts of the posterior fossa should be considered in the differential diagnosis of intracranial lesions in this region. Given that they can compress the brainstem and fourth ventricle and become symptomatic, surgical treatment is recommended upon diagnosis. multi-parametric MRI is an indispensable tool for achieving an accurate diagnosis and determining the surgical strategy.

Table 1. Summary of reported posterior fossa colloid cyst cases in the literature

Reference, year	Age/gender	Cases	Symptom	Fourth ventricle/ brainstem compression
Romero et al. (4), 1987	14/M	1	H/A, nausea	+
Tada et al. (5), 1993	44/F	1	H/A, nausea, gait disturbance	+
Müller et al. (6), 1999	45/F	1	H/A, nausea, gait disturbance	+
Andrews et al. (13), 1984	31/M 65/M	2	Hearing loss, facial paresthesia Vertigo, diplopia	+ +
Present study	39/F	1	H/A	+

M: Male, F: Female, H/A: Headache

Ethics

Informed Consent: Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

Footnotes

Authorship Contributions

Surgical and Medical Practices: İ.E., E.Ç., Concept: İ.E., Design: İ.E., Data Collection or Processing: İ.E., Analysis or Interpretation: İ.E., Literature Search: İ.E., Writing: İ.E.

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