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Case Report

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Cystic Meningioma with Interesting Imaging Characteristics in Frontal Region: A Case Report

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Running Title Cystic Meningioma, a Solid-Cystic Tumor with Bony Erosions

ABSTRACT

Introduction: Cystic meningioma is an unusual shape of meningioma, and the imaging manifestations and site of the solid/cystic components of the mass increase our difficulties in making a diagnosis.

Case report: We report a case of a 78-year-old right-handed woman who presented with right-sided hemiparesis, urinary incontinency, and Broca aphasia. A large left-sided frontal region cystic extra-axial mass with a suspicious small solid nodule and adjacent bony erosion was detected on non-contrast CT of the brain. Brain Magnetic resonance imaging (MRI) with gadolinium depicted the cystic and solid components exactly. A probable diagnosis of cystic meningioma was made and subsequently confirmed by histological study after surgical resection of the tumor. To confirm the category and subtypes of the tumor, a histopathological examination of the tumor cells should be done.

Conclusion: Cystic or solid cystic intracranial lesions have several differential diagnoses making the final diagnosis difficult in some cases. There are four types of cystic meningiomas according to the Nauta classification that was revised by Jung et al. Determination of the type of cystic meningioma is crucial for surgical planning. To confirm the category and subtypes of the tumor, a histopathological examination of the tumor cells should be done. Our case was a type IV cystic meningioma with a small mural enhancing solid nodule but an associated adjacent bony invasion.

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Introduction

Meningiomas are the most common primary brain tumors accounting for 15%-30% of all intracranial tumors [1]. Meningioma with the cystic component is an uncommon type of meningiomas accounting for 4%-7% of all intracranial meningiomas. It frequently affects men and, more commonly, is found in frontoparietal areas to be misdiagnosed as a glioma or metastasis due to their radiologic appearance. Moreover, previous strokes, subdural hematomas, and abscess formation could be the other less common differential diagnosis [1-5]. Here we report a rare and interesting case of cystic meningioma that would easily cause misguidance in management plans and post-operative diagnosis.

Case Presentation

A 78-year-old right-handed woman was estimated for right-sided hemiparesis and urinary incontinency from three months and Broca aphasia one month ago. The initial lab test was in the normal range. The initial unenhanced CT scan observed a well-defined, more dominant extra-axial cystic mass in the left frontal lobe with peripheral mural nodule and adjacent bone changes (Figure 1). On Magnetic resonance imaging (MRI), an extra-axial cystic mass with a peripheral mural nodule showed avid enhancement following contrast injection was detected. No surrounding edema or dural tail was found (Figure 2).

Our first diagnosis was a cystic meningioma, although the metastasis and hemangiopericytoma were included in our differential diagnosis regarding the extra-axial location of the mass with adjacent bony erosion. The mass was resected entirely, and the histopathological study proved cystic meningioma (Figures 3 and 4). The patient was discharged from our hospital with an excellent clinical condition 10 days after surgery. In the six months later follow-up, no recurrence was seen.

Discussion

About 2%-3% of the population has an incidental asymptomatic meningioma, and its incidence increases progressively with age [6]. Multiple risk factors, including a history of radiation (therapeutic or incidentally), head trauma, and genetic (Neurofibromatosis type 2), contribute to meningioma development, while most meningiomas are idiopathic with unknown etiology.

Meningiomas are extra-axial, often benign lesions that usually arise from meningothelial cells of dural coverings of the brain. Most of them originate from dural reflections and may be found at the optic nerve sheath and choroid plexus (intraventricular meningioma) [7]. Meningioma is a typically solid tumor, and a cystic meningioma is a rare form with an incidence of about 1.6%-11.7% of meningiomas, according to previous studies [8]. Cystic meningiomas are usually located at cerebral convexity, mainly in the frontoparietal region [2].

The exact mechanism of cyst formation in meningiomas is unknown; however, cellular necrosis, ischemia, hemorrhage, and active fluid secretion by the functional tumor cells into the mass are proposed as the underlying mechanism [9-15].

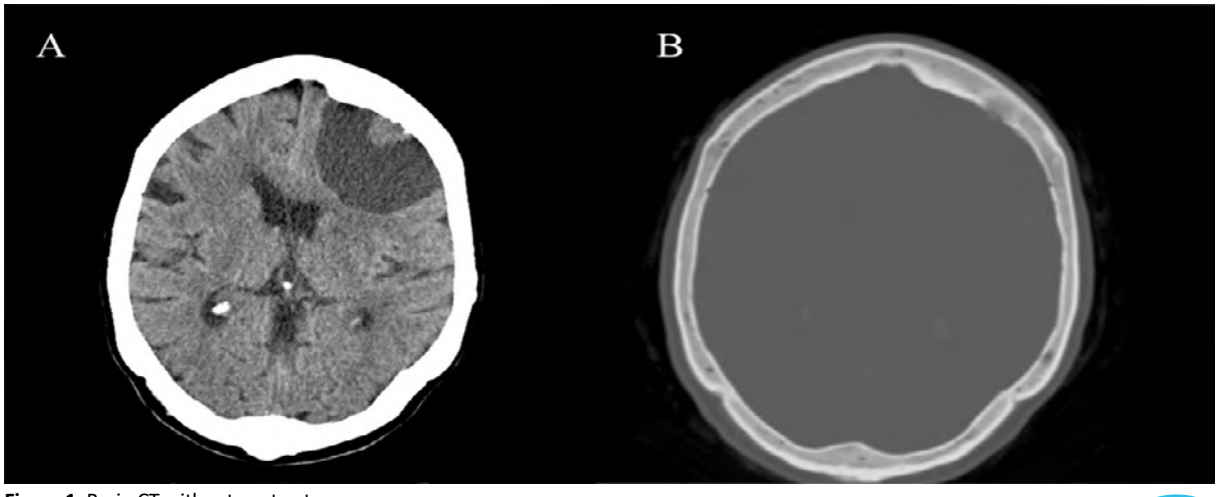

Figure 1. Brain CT without contrast

A: brain windows, B: bone windows. There is a 55*40 mm extra-axial hypodense cystic mass with a peripherally located isodense mural nodule in the left frontal region associated with adjacent frontal bone pressure erosion and minimal sclerosis. Mild mass effect and contra-lateral midline shift also are evident. No prominent edema is seen.

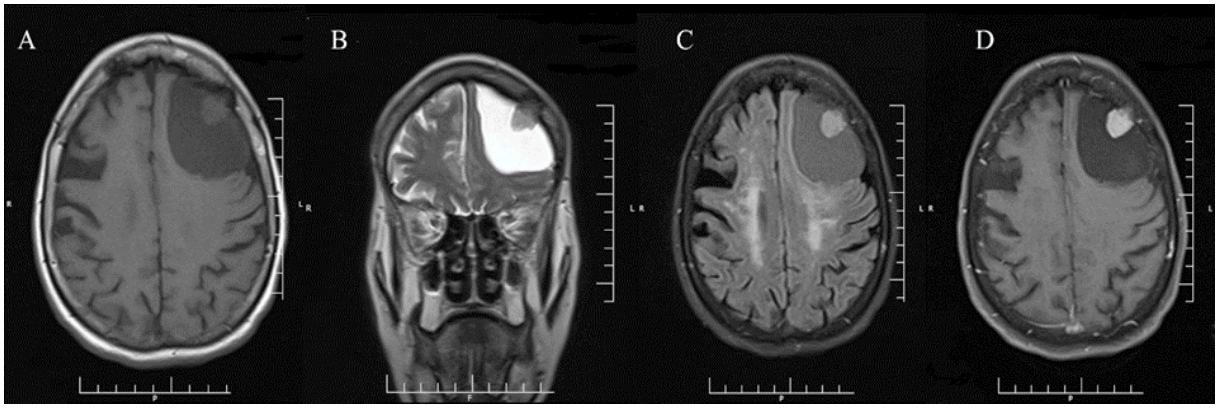

Figure 2. Brain MRI with and without contrast

A: T1 weighted image (axial), B: T2 weighted image (coronal), C: Fluid-attenuated inversion recovery (axial), D and E: post-contrast T1 weighted image (axial)

There is a 40* 55*60 mm cystic extra-axial mass with a homogenously enhancing mural nodule (15*15 mm) in the left frontal region with adjacent bone extension, irregularity, and a small enhancing component. Mass effect, contra-lateral midline shift, and subfascial hernia are also depicted. No prominent edema or dural tail is seen.

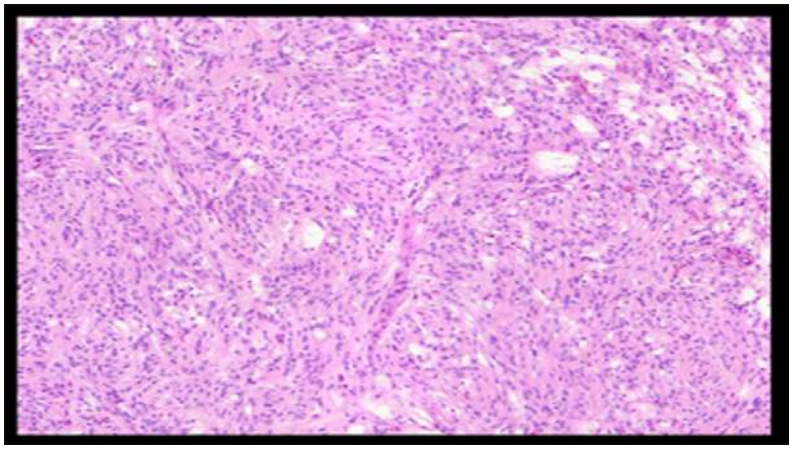

Figure 3. Microscopic evaluation of mass demonstrates a cellular neoplastic tissue composed of round to oval cells with indistinct cell membranes, eosinophilic cytoplasms, and round uniform nuclei with fine chromatin and inconspicuous nucleoli

Some of them form whorls. No mitotic figure or necrosis is noted.

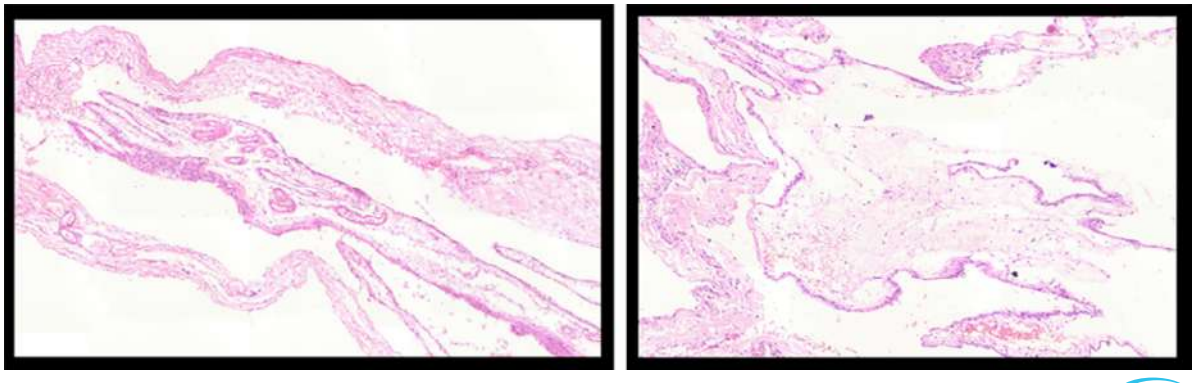

Figure 4. Microscopic examination of the brain tumor cyst wall show strips of fibro-connective tissue lined by a single layer as well as proliferated meningothelial cells that have PR and EMA positivity

Intracranial lesions with cystic or solid cystic appearance as high-grade gliomas, metastasis, hemangiopericytoma, hydatid cyst, and arachnoid cysts are essential differential diagnoses leading to incorrect preoperative diagnosis. The differentiation may be difficult and challenging in some cases in which other modalities like brain angiography, Diffusion-weighted imaging (DWI), Apparent diffusion coefficient (ADC) images, and MR spectrography could be helpful [3, 9-12].

Classification of cystic meningioma was initially proposed by Nauta et al. into four subtypes according to the location of the cyst to the brain and meningioma as follows: Type I, Intratumoral cysts that are centrally located in the tumor; Type II, Intratumoral cysts that are peripherally located and surrounded by meningioma; Type III, Peritumoral cyst in the adjacent parenchyma; Type IV, Peritumoral cyst between the tumor and the adjacent parenchyma [10].

The above classification was revised by Jung et al. by adding type V as a combination of types I and III meningiomas [2]. The classification of cystic meningiomas is crucial for preoperative planning, especially for type II and III cysts, because resection of the whole capsule with the cyst is necessary for type II while tumor excision only without the cyst is the choice plan in type III. Nevertheless, discrimination of these two types is not always easy through MRI, so histological evaluation or microsurgical assessment of the cyst wall is essential [8, 13].

The recent patient's MRI had depicted the presence of a Nauta type IV cystic meningioma. Widening of subarachnoid space, cerebrospinal fluid space mechanical trapping, and compression by the tumor and less frequently a true arachnoid cyst are the mechanisms of peritumoral cyst formation Nauta type IV [10]. Although this case was a type IV cystic meningioma, it presented with a significant cystic component and an enhancing small mural nodule that led to adjacent bone erosion and sclerosis and focally bony invasion of soft tissue as a small enhancing component that most of the previously reported ones had a more significant peripheral located soft tissue component leading to adjacent bony changes.

It should be mentioned that approximately 8% and 12% of all meningiomas with cystic changes are malignant and angioblastic, respectively [10]. Management of cystic meningiomas, like solid types, depends on patients' signs, symptoms, and comorbidities and the size and location of the tumor. Small asymptomatic cystic meningiomas can be managed conservatively with serial imaging similar to the solid types. The recurrence rate after complete resection with or without embolization is about 6% as well [14, 15].

Conclusion

Cystic meningiomas are uncommon forms that usually cause a dilemma in diagnosis, and MRI's diagnostic role is valuable for diagnosing and classifying the lesions. Finally, a histopathological diagnosis is always required to confirm the diagnosis.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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Conflict of interest

The authors declared no conflict of interest.

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