Microcystic meningioma diagnosis

- Misdiagnosis of chordoma: A case report and a review of the literature
- Brain tumor classification using MRI images and deep learning techniques
- Treatment and outcomes of concomitant parasellar meningiomas and anterior circulation aneurysms: a systematic review and perspective in the endovascular era
- Society of Family Planning Clinical Recommendation: Contraceptive considerations for individuals with cancer and cancer survivors part 3 - Skin, blood, gastrointestinal, liver, lung, central nervous system, and other cancers: Joint with the Society of Gynecologic Oncology
- Long-term Efficacy, Survival, and Toxicity of Peptide Receptor Radionuclide Therapy in Patients With Refractory Meningioma
- Radiomic study of common sellar region lesions differentiation in magnetic resonance imaging based on multi-classification machine learning model
- From Spinal Meningioma to Compressive Hematoma: A Case of Spontaneous Spinal Hematoma Mimicking Meningioma in a Pregnant Woman
- Spheno-orbital meningiomas: predictors of recurrence and novel strategies for surgical management

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1. Clinical evaluation

Symptoms depend on tumor location: headaches, seizures, focal deficits, or signs of increased intracranial pressure.

Sometimes found incidentally on imaging.

2. Imaging

MRI Characteristics

Extra-axial, well-circumscribed mass.

T2-weighted images: very high signal intensity (bright), more than typical meningiomas, due to the high fluid content of microcysts.

T1-weighted images: usually iso- to hypointense.

After contrast (gadolinium), enhancement can be heterogeneous (not uniform) — different from classic meningiomas which often enhance homogeneously.

May show a “soap-bubble” or reticular appearance.

Sometimes associated with a dural tail.

SPECT

Microcystic meningiomas are rare but benign brain tumors. Previous reports have shown that Thallium-201 single-photon emission computed tomography (201Tl SPECT) demonstrated a higher late-phase accumulation of 201Tl in malignant or recurrent meningiomas than in nonaggressive meningiomas.

A case of a microcystic meningioma with a high 201Tl SPECT retention rate in a 62-year-old woman who complained of headache. Computed tomography revealed an intracranial tumor in the right frontal lobe. Moreover, 201Tl SPECT revealed a high uptake of 201Tl in the tumor, which was particularly prominent in the delayed phase. The uptake index on an early image was 1.46 and that on a delayed image was 1.35. Therefore, the retention index was 0.92. After 2 years of tumor growth, we performed successful radical resection, and histological examination revealed the presence of a microcystic meningioma. Therefore, 201Tl SPECT may be useful for the preoperative diagnosis of microcystic meningiomas and that late-phase accumulation of 201Tl is not a specific finding of malignant brain tumors. Therefore, we need to be careful in the evaluation and judgment of high retention in a delayed image of 201Tl SPECT [1].

Fluciclovine Positron Emission Tomography

A 69-year-old asymptomatic woman underwent magnetic resonance imaging (MRI), revealing a left parietal lobe tumor suspected to be a high-grade glioma (HGG). [18F]Fluciclovine positron emission tomography (PET), which reflects amino acid metabolism, showed moderate uptake [SUVmax 1.4, tumor-to-normal ratio (TNR) 1.9], consistent with HGG, whereas [18F]fluorodeoxyglucose-PET findings demonstrated low uptake (SUVmax 2.5, TNR 0.22), which is atypical for HGG. Surgical and pathologic investigations confirmed the diagnosis of microcystic meningioma, a rare subtype classified as grade 1. Microcystic meningiomas mimic HGG on magnetic resonance imaging and [18F]fluciclovine-PET due to l-amino acid transporter expression, complicating diagnosis [2]

This report compellingly illustrates that fluciclovine uptake is not specific for high-grade malignancy in CNS tumors. Clinicians must interpret PET findings in conjunction with clinical history, MRI features, and alternative PET tracers like FDG. Future work should include larger studies evaluating false-positive rates of fluciclovine-PET in brain tumors and the molecular basis of tracer uptake in benign lesions like meningiomas.

3. Histopathology

Essential for definitive diagnosis.

Microscopic features:

Loose, edematous tissue.

Abundant microcysts filled with fluid.

Round/oval nuclei, sparse mitotic activity.

Immunohistochemistry

Positive for EMA (epithelial membrane antigen).

Positive for vimentin.

Low Ki-67 (proliferation index), consistent with low-grade tumor.

4. Differential diagnosis

Other cystic brain tumors (e.g., hemangioblastoma, pilocytic astrocytoma, metastases).

Imaging and pathology together help distinguish it.

1)
Matano F, Adachi K, Murai Y, Kitamura T, Ohashi R, Teramoto A, Morita A. Microcystic Meningioma with Late-phase Accumulation on Thallium-201 single-photon emission computed tomography: Case Report. Neurol Med Chir (Tokyo). 2014 Jan 10. [Epub ahead of print] PubMed PMID: 24418788.
2)
Takenaka J, Hirata K, Watanabe S, Ishi Y, Kudo K. Fluciclovine-PET Uptake in Microcystic Meningioma Mimicking High-grade Glioma: A Case Report. Clin Nucl Med. 2025 Apr 24. doi: 10.1097/RLU.0000000000005924. Epub ahead of print. PMID: 40279665.