PCNSL Mimicking Glioblastoma in an Immunocompetent Female: A Diagnostic and Therapeutic Challenge

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1 BACKGROUND

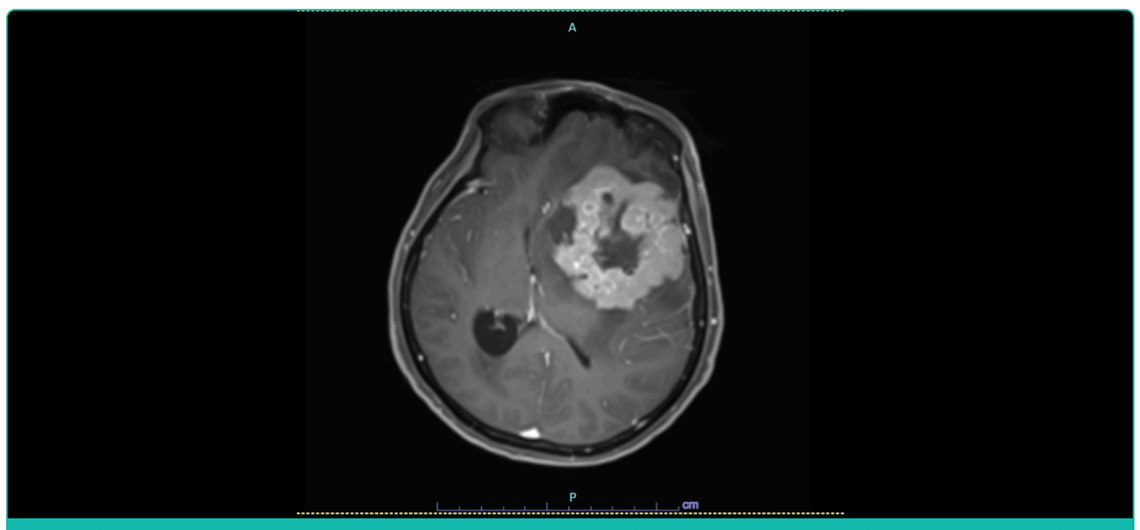
Primary Central Nervous System Lymphoma (PCNSL) in immunocompetent patients typically presents as a mass with homogeneous contrast enhancement. However, **10–15% of cases** show atypical features such as central necrosis and irregular ring enhancement that closely resemble **glioblastoma multiforme (GBM)**.

This radiologic mimicry creates a critical diagnostic challenge because the surgical management of these two entities is fundamentally different. GBM benefits from **maximal safe resection**, whereas PCNSL is treated with **chemotherapy** and extensive resection does not improve survival and instead poses a risk of adding neurological deficits.

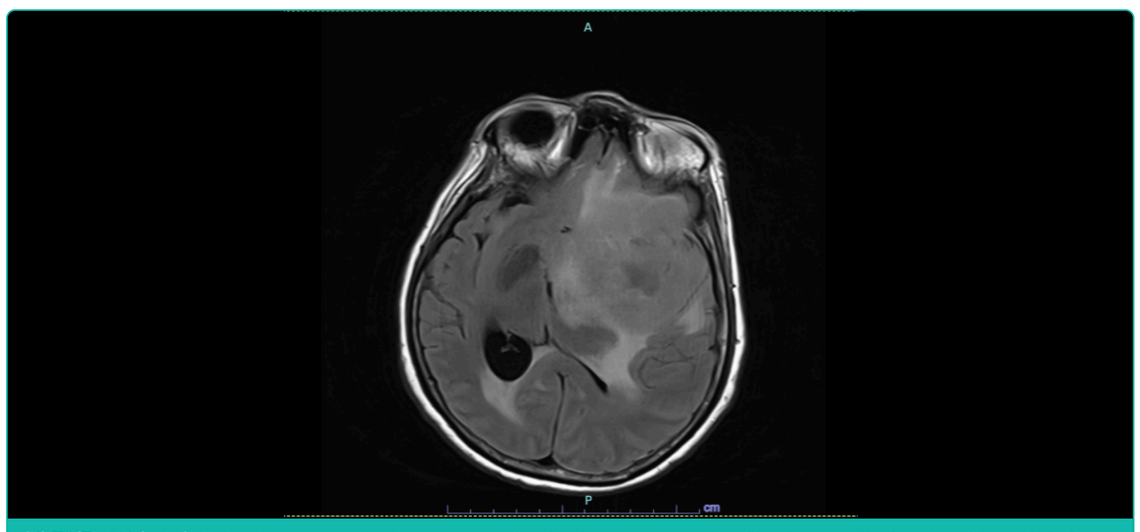
2 CASE PRESENTATION

- A **56-year-old immunocompetent woman** presented to the emergency department with decreased consciousness and progressive chronic weakness of the right limbs.
- **Head MRI:** lobulated mass (6.6 × 7.0 × 5.6 cm) in the left frontal lobe extending to the basal ganglia with extensive central necrosis and irregular ring enhancement.
- **Working diagnosis:** high-grade glioma (suspected GBM).
- **Intervention:** craniotomy tumor removal under glioma protocol.
- **Histopathology:** atypical lymphoid cells with angiocentric pattern, consistent with **diffuse large B-cell lymphoma (DLBCL)**.
- **Outcome:** consciousness improved to fully alert; motor strength improved; therapy switched to **high-dose methotrexate (HD-MTX)** chemotherapy.

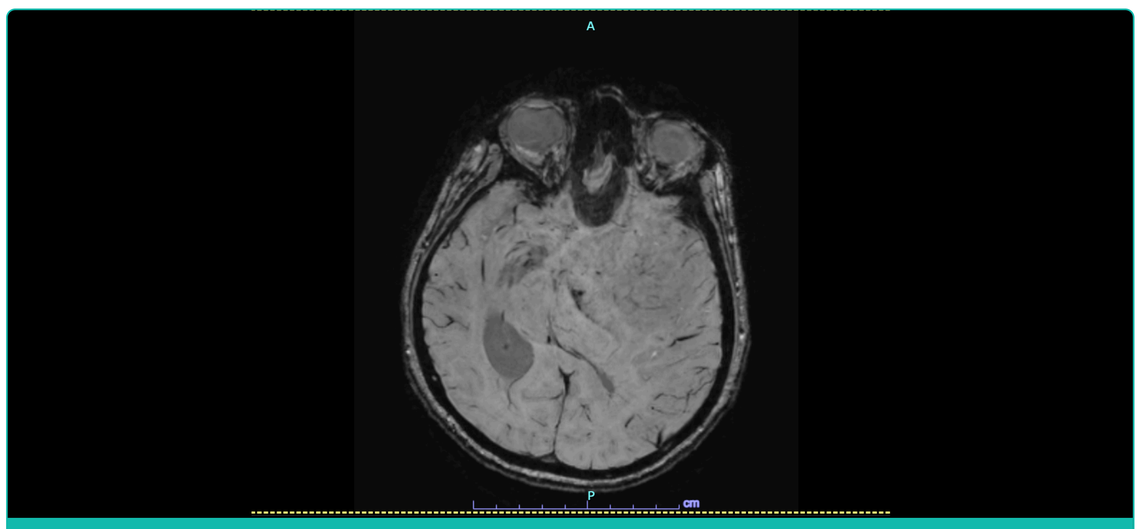
Figure 1. Pre-operative Head MRI with Gadolinium Contrast



(A) T1-Weighted post-contrast (axial): Intra-axial mass in the left frontal lobe extending to the basal ganglia with irregular ring enhancement and extensive central necrosis (white arrow), resembling glioblastoma.



(B) T2/FLAIR (axial): Extensive vasogenic edema surrounding the tumor causing significant mass effect and midline shift to the contralateral side.



(C) SWI — Susceptibility Weighted Imaging: Hypointense signal areas within the tumor indicating mild intratumoral hemorrhage.

3 DISCUSSION

Radiological Mimicry

The hallmark MRI finding of PCNSL in immunocompetent patients is a solitary, homogeneously enhancing periventricular mass with strong diffusion restriction. However, **10–15%** present with central necrosis and ring enhancement mimicking GBM. Necrosis in PCNSL is thought to occur when the tumor outgrows its blood supply. Differential diagnosis also includes solitary brain metastasis and cerebral abscess.

Role of Intraoperative Frozen Section

Frozen section has **>90% accuracy** in distinguishing glioma (fibrillary glial cells) from lymphoma (diffuse small round blue cells). Per NCCN guidelines, if intraoperative frozen section suggests lymphoma, resection should be immediately halted and the procedure limited to adequate biopsy only, to prevent surgical morbidity from unnecessary extensive resection.

The "Vanishing Tumor" Phenomenon

Corticosteroids have direct **cytotoxic and lympholytic effects** on PCNSL cells. Pre-biopsy steroid administration can cause massive tumor cell lysis, yielding non-diagnostic tissue where biopsy shows only reactive inflammatory infiltrate instead of malignant lymphoid cells. The principle of **"no tissue, no steroid"** must be strictly upheld to ensure diagnostic accuracy.

Treatment Paradigm Shift

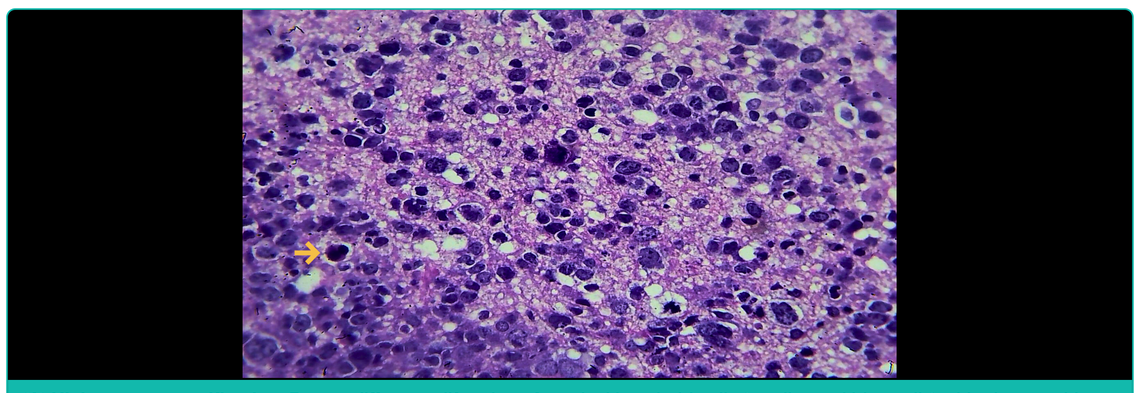
Upon histological confirmation of DLBCL, therapy was redirected from the glioma protocol (radiotherapy + temozolomide) to **high-dose methotrexate-based chemotherapy combined with Rituximab** (anti-CD20 monoclonal antibody), in the R-MTX or R-MPV regimen, as recommended by NCCN Guidelines 2025 for PCNSL.

Prognosis

PCNSL prognosis can be estimated using the **MSKCC prognostic score**. This patient, aged >50 years with KPS >70, falls into the intermediate group with a projected **median overall survival of 3.2 years** with appropriate chemotherapy.

HISTOPATHOLOGICAL DIAGNOSIS

Figure 2. Hematoxylin & Eosin (H&E) Staining



(A) High-power magnification: Dense, diffuse proliferation of atypical lymphoid cells (small round blue cells) with pleomorphic nuclei, coarse chromatin, and prominent nucleoli.

(B) Angiocentric growth pattern (red arrow): Tumor cells concentrated around blood vessels — a characteristic hallmark of Primary CNS Lymphoma, distinguishing it from glioblastoma.

4 CONCLUSION

- Clinicians should maintain a **high index of suspicion for PCNSL** in necrotic intracranial masses involving deep brain structures, even in immunocompetent patients.
- **Intraoperative frozen section** is highly recommended to ensure diagnostic accuracy and guide appropriate surgical decisions (biopsy vs. resection), avoiding morbidity of unnecessary aggressive resection.
- The principle of **"no tissue, no steroid"** should be strictly upheld to prevent the vanishing tumor phenomenon and preserve diagnostic yield.
- **Multidisciplinary management** involving neurosurgery, neurology, radiology, pathology, and oncology is essential to ensure appropriate methotrexate-based chemotherapy and optimize clinical outcomes.

Primary CNS Lymphoma · Glioblastoma Mimicry · Immunocompetent · Frozen Section · Vanishing Tumor

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