Lymphomas- Part 1

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KEYWORDS

• CNS lymphoma • Imaging findings in lymphoma • Diffusion-weighted imaging
• Diffusion tensor imaging • Perfusion-weighted imaging • Dynamic contrast enhanced MR imaging
• MR spectroscopy • Posttreatment evaluation

KEY POINTS

- Lymphoma is a highly cellular tumor with a high nuclear/cytoplasm ratio, hence typically hyperdense on CT, isointense to gray matter on T2, and with restricted diffusion.
- Elevated choline and high lipids are typical of lymphoma.
- High blood volume may not be demonstrated despite its high malignancy.
- Lymphomas may dramatically shrink or disappear after steroids.
- Restricted diffusion may not be demonstrated in lymphoma after steroid therapy.

INTRODUCTION

Primary central nervous system lymphomas (PCNSL) were previously considered rare, representing 1% of all intracranial tumors.[1,2] There is a recent increase in their incidence and it is estimated that AIDS-related PCNSL is now more common than low-grade astrocytomas and as common as meningiomas.[3]

PCNSL involves CNS without systemic disease. Lesions may be restricted to the brain, leptomeninges, spinal cord, and/or the eyes.

The origin of PCNSL remains controversial and unknown because the CNS does not have endogenous lymphoid tissues or lymphatic circulation.[4] The only established risk factor is immunodeficiency. There are three groups at risk for developing PCNSL: (1) organ transplant recipients, (2) patients with congenital immunodeficiency syndrome, and (3) those with AIDS and other systemic diseases associated with immunodeficiency.[5]

Incidence is especially high in patients with AIDS[6]; 2% to 10% of AIDS patients with AIDS develop lymphoma during their illness.[7] The frequency of PCNSL is decreasing among AIDS patients who receive highly active antiretroviral therapy.[8,9]

The common denominator present in CNS lymphoma of immunocompromised patients is a dysfunction of the suppressor T-cell system permitting proliferation and neoplastic transformation of B-cell lymphocites.[10] Nearly all PCNSL are of the non-Hodgkin type derived from B lymphocytes.[10,11] When Hodgkin lymphoma involves the brain it is almost always in the presence of systemic disease or dural involvement.[12]

The peak age for CNS lymphoma in the non-AIDS population is during the sixth decade of life with men affected more than women.[10]

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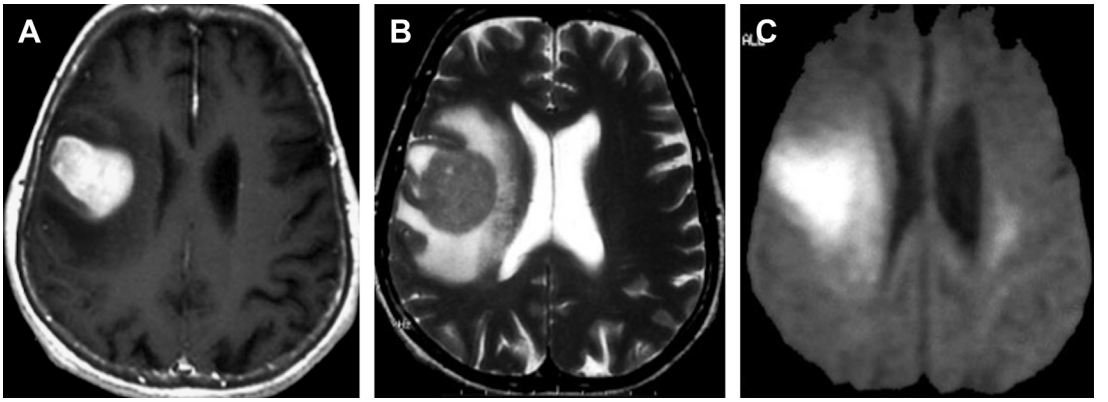

Fig. 1. Supratentorial location, solitary mass. A 71-year-old woman with a well-circumscribed lesion in the right frontal lobe with solid enhancement (*A*, axial T1 with contrast), isointense to gray matter on T2 (*B*, axial T2), and bright on diffusion-weighted imaging (DWI) (*C*) indicating restricted diffusion. Pathology was consistent with lymphoma.

IMAGING FINDINGS

Location

Approximately 70% to 85% of cases involve the supratentorial compartment (**Figs. 1** and **2**).[5,13] Focal intracerebral masses are the most common initial presentation of PCNSL,[5] whereas the subarachnoid space is a common site for recurrent disease.[2] Classic imaging findings of parenchymal lymphoma include solitary (see **Fig. 1**) or multiple (see **Fig. 2**) masses that involve the deep gray matter, periventricular regions, and corpus callosum (**Fig. 3**).[8,13] Up to 75% of lymphoma masses are in contact with

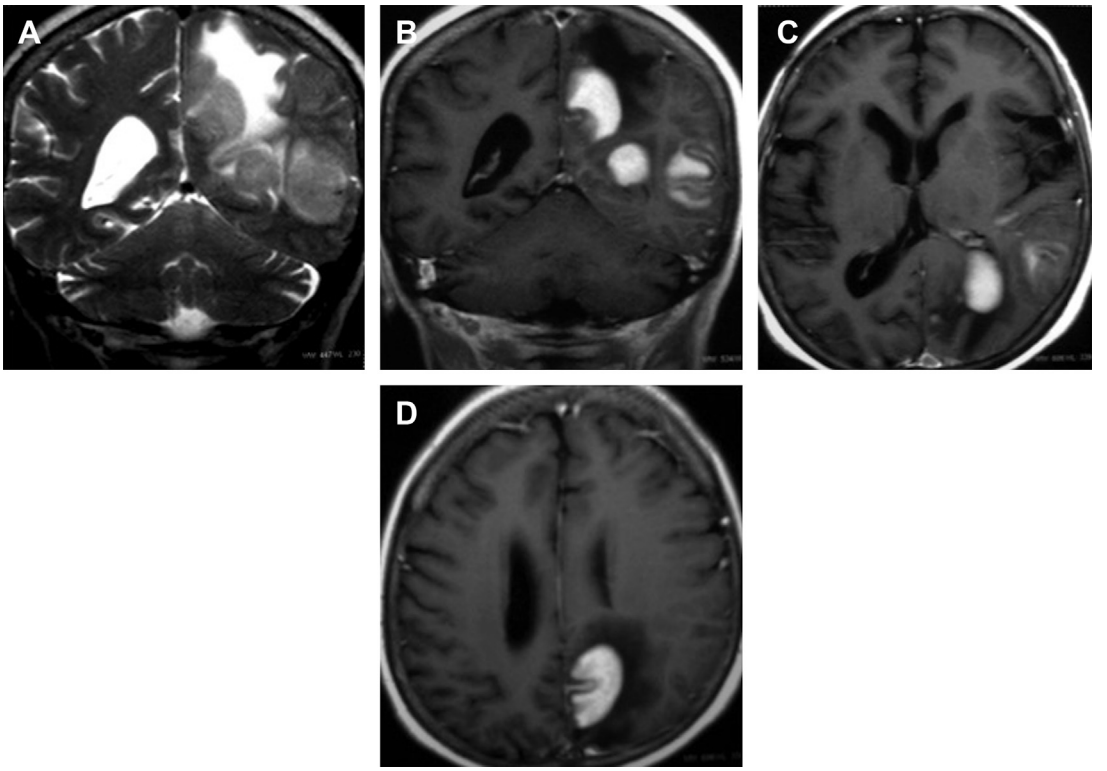

Fig. 2. Supratentorial location, multifocal lesions. A 64-year-old woman presenting with right hemiparesis and cognitive impairment. There are multifocal solid lesions in the left parietal lobe isointense to gray matter on coronal T2 (*A*) with marked enhancement (*B*, coronal; *C*, *D*, axial T1 with contrast).