Primary central nervous system T-cell lymphoma

Case report

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Primary central nervous system (CNS) T-cell lymphoma is extremely rare. The present case report provides immunocytochemical evidence for a cerebellar CNS T-cell lymphoma. The patient underwent surgery followed by radiation therapy and is alive and well 36 months postoperatively. The clinical and pathological features of primary CNS T-cell lymphoma as well as diagnostic measures and treatment options are discussed, together with a compilation of all previous case reports of primary CNS T-cell lymphomas.

Key Words • T-cell lymphoma • immunosuppression • lymphoma

Much attention has been focused on primary central nervous system (CNS) lymphoma since the first case was reported in 1929. This rare neoplasm accounts for less than 2% of all malignant lymphomas and less than 1.5% of all intracranial tumors. Although its association with congenital and acquired immunological deficits and autoimmune diseases is thought to be significant, the pathogenesis of primary CNS lymphoma is not well understood. In fact, the cell of origin of primary CNS lymphomas is controversial. Transplant recipients and patients with the acquired immune deficiency syndrome (AIDS) now account for many of the cases of primary CNS lymphoma; in fact, this tumor is the second most common CNS mass lesion in the population positive for human immunodeficiency virus (HIV). Thus, with the spread of AIDS, the incidence of primary CNS lymphoma is expected to rise dramatically. It is essential that the correct ante-mortem diagnosis be made, since specific treatment of primary CNS lymphoma is effective.

In the non-immunosuppressed population, large-cell non-Hodgkin’s lymphoma is the most common primary CNS lymphoma and is of B-cell origin. Small non-cleaved-cell and immunoblastic lymphomas are common forms of CNS and non-Hodgkin’s lymphomas in AIDS and other immunosuppressed patients. Testing with contemporary immunocytochemical methods has shown that this concept is generally valid. Indeed, primary CNS lymphomas of T-cell origin are a distinct rarity. To date, there have been only 14 reported cases of primary CNS T-cell lymphoma. The present report describes a primary CNS lymphoma of T-cell origin in the cerebellum and provides a compilation of all reported primary CNS T-cell lymphomas.

Case Report

This 32-year-old white man was healthy until 2 months prior to his first hospital admission when he noted the onset of a constant, dull occipital headache. The pain was initially relieved with ibuprofen but he sought further medical attention when nausea and vomiting developed.

Examination. He denied any difficulty with balance, coordination, vision, or weight loss. Except for a slightly wide-based gait, the general and neurological examinations were unremarkable. Social history revealed the patient was a nonsmoker and used ethanol rarely. His family history was significant in that his mother died of “cancer” with possible metastases to the brain.

Computerized tomography (CT) of the brain revealed two densely enhancing mass lesions, one in the right cerebellar hemisphere measuring 2 cm and one in the left cerebellar hemisphere measuring 4 cm (Fig. 1 left). The patient was placed on a course of high-dose dexamethasone (10 mg orally every 6 hours). A full
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metastatic workup failed to demonstrate any systemic neoplastic process. The cerebrospinal fluid (CSF) was also negative for any malignant cells and HIV serology was negative. A vertebral angiogram demonstrated avascular mass effects in both cerebellar hemispheres without evidence of neovascularity or blush.

Follow-up CT scanning 1 week after admission revealed that the cerebellar masses had decreased in size, and CT scanning 3 days later showed that the right cerebellar mass was no longer evident. By 2 months after presentation, the left cerebellar mass was approximately 1 cm in size (Fig. 1 right). The patient remained asymptomatic.

Operation. For diagnosis and treatment, the patient underwent a left suboccipital craniectomy with gross total removal of the left cerebellar mass. At surgery, the leptomeninges appeared normal; however, the cerebellar cortex overlying the lesion was relatively avascular and the lesion itself appeared tannish-gray.

Pathological Examination. Histological study of the specimen revealed that the CNS parenchyma and leptomeninges were partly invaded by masses of lymphocytes (Fig. 2) with a fairly significant number of admixed plasma cells. These took the form of prominent perivascular (Fig. 3 left) and intra-adventitial cellular collections that spread out from these locations to form fairly large sheet-like masses (Fig. 3 right). Astrocytic gliosis was present, with some of the astrocytes showing large, bizarre, hyperchromatic nuclei. The lymphocytes appeared as very monotonous small cells with scant cytoplasm and dark nuclei. There were no mitotic figures or necrosis. The cells identified as lymphocytes were positive to common leukocyte antigen (Fig. 4 left) and stained with antibodies directed against T cells (Fig. 4 right).

![Image 1](https://via.placeholder.com/150)

Fig. 1. Preoperative contrast-enhanced computerized tomography scans. Left: Scan obtained on admission showing enhancing mass lesions within both right and left cerebellar hemispheres. Right: Scan obtained 1 week later demonstrating marked reduction in the size of the left cerebellar lesion and the replacement of the enhancing lesion in the right cerebellar hemisphere by a region of low attenuation.

![Image 2](https://via.placeholder.com/150)

Fig. 2. Low-power photomicrograph of the left cerebellar mass showing sheets of small round cells without evidence of necrosis. H & E, bar = 100 μ.

![Image 3](https://via.placeholder.com/150)

Fig. 3. Photomicrographs from other areas of the tumor showing both a perivascular (left) and intra-adventitial (right) distribution of cells. H & E, bar = 100 μ (left) and 25 μ (right).
M. Bednar, et al.

**FIG. 4.** Left: Immunocytochemical staining using an antibody directed against common leukocyte antigen (DAKO mouse monoclonal antileukocyte common antigen; clone po 7/26 and 2B11). Essentially all of the tumor cells were immunolabeled by this antibody. Avidin biotin method, bar = 20 μ. Right: Immunocytochemical staining using an antibody directed against T lymphocytes (DAKO monoclonal mouse anti-human T cell; clone UCH1). Greater than 90% of the tumor cells were immunolabeled by this antibody. Avidin biotin method, bar = 25 μ.

**FIG. 5.** Photomicrograph showing prominent perivascular ventricular proliferation reticulin stain, bar = 25 μ.

**FIG. 6.** Postoperative contrast-enhanced computerized tomography scan demonstrating regions of low density in both cerebellar hemispheres without evidence of tumor enhancement.

Reticulin stain showed prominent reticulum proliferation in a perivascular distribution (Fig. 5).

**Postoperative Course.** The patient did well postoperatively and remained neurologically intact. He was discharged home on postoperative Day 6. He underwent radiation therapy with 4600 rad directed to the operative site and a 1000-rad cranial boost in the 2 months following his discharge. He tolerated the radiation therapy well. He is now 3 years postsurgery, working full time. He denies any complaints. His neurological examination is unremarkable and both his last chest x-ray film and CT brain scan were negative for any lesions (Fig. 6).

**Discussion**

Primary CNS lymphoma of T-cell origin is a rare lesion. Recently, Morgello, et al., and C Rao (unpublished data) treated an additional four patients with primary CNS T-cell lymphomas. We describe a case of primary CNS T-cell lymphoma of the cerebellum and discuss the 15 cases reported to date (Table 1).

The need for brain biopsy to establish an accurate diagnosis in our case reinforces the experience of others who have demonstrated the lack of reliability of CSF cytology, even with repeated lumbar punctures. Indeed, a confirmatory biopsy was typically performed even in those cases in which the presumptive diagnosis was made by CSF cytology.

The present case report is similar in its presentation to that of CNS lymphomas in general. Our patient presented with general symptoms referable to increased intracranial pressure and focal symptoms referable to the site of involvement. Steroid therapy had a marked
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### TABLE 1

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Age (yrs.)</th>
<th>Sex</th>
<th>CNS Site</th>
<th>Cytchemistry</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schmitt-Graff &amp; Pfizer, 1983</td>
<td>52, M</td>
<td></td>
<td>leptomeninges</td>
<td>acid phosphatase</td>
<td>MTX biopsy; RT; chemotherapy</td>
<td>died (11 mos)</td>
</tr>
<tr>
<td>Grant, et al., 1986</td>
<td>63, M</td>
<td></td>
<td>midline subfalcine mass leptomeninges</td>
<td>pan T-cell &amp; T-helper AB's</td>
<td>MTX biopsy</td>
<td>died (11 mos)</td>
</tr>
<tr>
<td>Marsh, et al., 1983</td>
<td>20, M</td>
<td></td>
<td>leptomeninges</td>
<td>OKT-3: acid phosphatase</td>
<td>biopsy; thioreta. MTX; RT biopsy</td>
<td>remission (2 mos)</td>
</tr>
<tr>
<td>O'Neill, et al., 1987</td>
<td>38, F</td>
<td></td>
<td>thalamus</td>
<td>CLA (negative Ig light chain) leu-1, leu-2a, leu-3a (negative Ig light chain)</td>
<td>biopsy</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>17, M</td>
<td></td>
<td>cerebellum</td>
<td>acid phosphatase</td>
<td>surgery</td>
<td>NR</td>
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<td>Bogdahn, et al., 1986</td>
<td>2, F</td>
<td></td>
<td>superior vermis</td>
<td>acid phosphatase</td>
<td>RT; chemotherapy; surgery</td>
<td>partial remission (24 mos)</td>
</tr>
<tr>
<td>Morgello, et al., 1989</td>
<td>51, M</td>
<td></td>
<td>lateral ventricle frontal mass, leptomeninges</td>
<td>acid phosphatase</td>
<td>RT; MTX</td>
<td>alive (14 mos)</td>
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<tr>
<td></td>
<td>30, M</td>
<td></td>
<td>cerebellar hemispheres</td>
<td>pan T-cell AB, T-helper &amp; suppressor AB's (negative Ig light chains)</td>
<td>same</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>28, M</td>
<td></td>
<td>temporal lobe &amp; brain stem cerebellar hemisphere</td>
<td>CLA; pan T-cell AB</td>
<td>biopsy; RT; MTX, Ara-C</td>
<td>died (20 mos)</td>
</tr>
<tr>
<td></td>
<td>60, F</td>
<td></td>
<td>cerebellar hemispheres</td>
<td>T-cell markers</td>
<td>biopsy</td>
<td>died (21 mos)</td>
</tr>
<tr>
<td>Grant &amp; von Deimling, 1990</td>
<td>64, M</td>
<td></td>
<td>cerebral hemisphere</td>
<td>T-cell markers</td>
<td>RT; surgery (gross total)</td>
<td>alive &amp; well (8 mos)</td>
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<tr>
<td>Kuwata, et al., 1987</td>
<td>50, M</td>
<td></td>
<td>temporalparietal</td>
<td>T-cell markers</td>
<td>RT; chemotherapy; surgery</td>
<td>alive (14 mos)</td>
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<tr>
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<td></td>
<td>cerebellar vermis</td>
<td>pan T-cell AB</td>
<td>biopsy</td>
<td>died</td>
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<tr>
<td></td>
<td>36, M</td>
<td></td>
<td>temporal lobe</td>
<td>pan T-cell AB</td>
<td>biopsy</td>
<td>NR</td>
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<tr>
<td>Bednar, et al., 1991</td>
<td>32, M</td>
<td></td>
<td>cerebellum</td>
<td>CLA; immunoperoxidase</td>
<td>RT; surgery (gross total)</td>
<td>alive &amp; well (36 mos)</td>
</tr>
</tbody>
</table>

*Abbreviations: CNS = central nervous system; AB = antibody; MTX = methotrexate; RT = radiation therapy; NR = not recorded; CLA = common leuokocyte antigen; Ig = immunoglobulin; Ara-C = cytosine arabinoside.

Effect, with transient relief of the CNS symptoms. Our patient demonstrated full resolution of his symptoms shortly after steroid therapy was initiated. Various other modalities have been used in the treatment of primary CNS T-cell lymphoma: surgery, radiation therapy, and chemotherapeutic regimens. Both radiation therapy and chemotherapy are considered to be beneficial, although the small number of cases reported prohibits a definitive assessment of any adjuvant therapy. Our patient has completed a course of radiation therapy and remains neurologically intact after more than 3 years from the time of his diagnosis, despite the observation that the prognosis for CNS non-Hodgkin's lymphoma is generally poor. In comparing the features of the present case to those of other primary CNS T-cell lymphomas, it is not clear why our patient has survived longer than other reported patients. It is of interest that most other patients underwent surgical biopsy instead of an attempt at gross total removal as in the present case. Indeed, the longest survivor recorded so far also underwent a gross total removal with the patient remaining in remission 2 years following surgery.

The rarity of T-cell cerebellar lymphoma prohibits a definitive statement regarding its management. However, an aggressive surgical approach used in the present case enabled both a confirmative tissue diagnosis and a substantial reduction in the tumor burden. This may, when combined with adjuvant therapy, result in remission or permanent cure as seen in the present case.

### References


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