Pineal Germinoma With Granulomatous Reaction
—Case Report—

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Abstract

A 20-year-old man presented with diplopia. Neurological examination revealed mild skew deviation and upbeat nystagmus. Computed tomography showed a clover-shaped isodense mass in the pineal region with homogeneous enhancement. The lesion was isointense on both T1- and T2-weighted magnetic resonance (MR) imaging with homogeneous enhancement by gadolinium-diethylenetriaminepentaacetic acid. Cerebral angiography showed no tumor staining. Serum and cerebrospinal fluid were negative for b-human chorionic gonadotropin, a-fetoprotein, and placental alkaline phosphatase. Open biopsy was performed using a right occipital transtentorial approach. Histological examination revealed a tumor consisting of clusters of germinoma cells, but with prominent infiltration of lymphocytes, plasma cells, and macrophages, and proliferation of small vessels. The histological diagnosis was germinoma with granulomatous reaction. MR imaging showed complete disappearance of the tumor after chemoradiotherapy. Neurosurgeons should be aware of this rare tumor to avoid misdiagnosis as granulomatous inflammation.

Key words: germinoma, granulomatous reaction, pineal body

Introduction

Granulomatous reaction is a frequent feature in testicular seminoma, but is rare in intracranial germinoma. Inflammatory changes were detected in two of 43 cases with intracranial germinoma, whereas inflammatory reactions of varying intensity are found in all germinomas and in the germinomatous parts of mixed neoplasms. We report a rare case of pineal germinoma with granulomatous reaction.

Case Report

A 20-year-old man was admitted to our hospital with diplopia. Neurological examination revealed mild skew deviation and upbeat nystagmus, but no signs of increased intracranial pressure. Computed tomography (CT) revealed a clover-shaped, slightly hyperdense mass in the pineal region with homogeneous enhancement, in addition to mild ventriculomegaly. Magnetic resonance (MR) imaging indicated an isointense lesion with homogeneous enhancement using gadolinium-diethylenetriaminepenta-acetic acid (Gd-DTPA) on both T1- and T2-weighted imaging (Fig. 1). Left carotid angiography demonstrated no tumor stains around the lesion. Serum and cerebrospinal fluid levels of b-human chorionic gonadotropin were <0.5 and 0.7 ng/ml, respectively, and a-fetoprotein levels were 4.3 and 2.5 ng/ml, respectively. The level of placental alkaline phosphatase (PLAP) was 148 IU/l at pre-heating and 0 IU at post-heating in serum, and 2 IU/l at pre-heating and 0 IU/l at post-heating in cerebrospinal fluid, with no significant differences.

Open biopsy was performed using a right occipital transtentorial approach. The tumor was grayish, hypovascular, elastic hard, and could not be aspirated, unlike typical macroscopic findings for germinoma. The abundance of inflammatory cells and absence of tumor cells made diagnosis difficult using frozen specimens. Histological examination revealed scattered large polygonal cells with relatively prominent nucleoli and abundant cytoplasm, and prominent infiltration of lymphoplasmacytoid cells and macrophages with proliferation of small vessels (Fig. 2A, B). Granulomatous reaction such as the presence of macrophages, giant cells, and fibrosis were recognized in nearly all tumor specimens. KP-1 immunohistochemical staining detected abundant macrophages and giant cells (Fig. 2C). Clusters of germinoma cells were not identified by PLAP, but were by CD117 (Fig. 2D). The histological diagnosis
was germinoma with granulomatous reaction.

Follow-up MR imaging showed the tumor had completely disappeared after combined chemotherapy with carboplatin and VP-16, and radiotherapy with 40 Gy (whole brain 30 Gy, local 10 Gy). He was discharged on the 56th day and returned to his previous occupation.

Discussion

Germinoma containing granulomatous reaction as the major component of the tumor is very difficult to identify (Table 1). Two such cases were pineal tumors like our case. The clinical features are as follows. Age distribution is slightly higher than that of common cerebral germinomas with male preponderance. The location, size, and favorable prognosis are similar to those of common germinoma. Histological characteristics include prominent nucleoli and mitotic figures, and variable proportions of the tumor cells display inflammatory components, but the area of inflammation always occupies the major part of the specimen. Consequently, intraoperative examination of frozen specimens can lead to a misdiagnosis of granuloma, and the histological diagnosis may be difficult to establish if few tumor cells are present. Stereotactic biopsy led to the correct diagnosis in only one case, while further biopsies or direct surgery were needed in the other cases.

The neuroimaging findings for common cerebral germinoma are known. CT demonstrates high- or slightly high-density lesions with homogeneous enhancement, clear or obscure margins, and peritumoral edema on rare occasions. MR imaging shows the tumor as iso- or hypointense on T1-weighted imaging, and hyper- or isointense on T2-weighted imaging, with homogeneous enhancement from GdDTPA. These neuroimaging findings of granulomatous germinoma are similar to those for common cerebral germinoma. Preoperative neuroimaging is thus of little value for identifying this rare type of germinoma.

Immunohistochemical staining for PLAP is important. However, in our case, serum and cerebrospinal fluid levels of PLAP were under the detectable limits, and tumor cells were negative for PLAP even in histological specimens, although positive for CD117. The proto-oncogene c-kit (CD117) is now known to be diffusely positive on the cell surface of germinoma and may offer a novel, more reliable tumor marker for central nervous system germinoma than other markers such as PLAP.

Intraoperative findings of an elastic hard, hypovascular tumor that cannot be aspirated, as in our case, may be characteristic of germinoma with granulomatous reaction. Ultimately, no definitive tools for identifying this rare tumor are available other than detecting germinoma cells in multiple specimens. Neurosurgeons should be aware of this subtype of germinoma to avoid misdiagnosis as chronic granulomatous inflammation.
Table 1  Clinical features of intracranial germinomas with granulomatous reaction

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Age/ Sex</th>
<th>Location</th>
<th>Symptom</th>
<th>Tumor marker</th>
<th>Neuroimaging findings</th>
<th>Immuno-staining</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CT</td>
<td>MR imaging</td>
</tr>
<tr>
<td>Kraichoke et al. (1988)³</td>
<td>19/M</td>
<td>third ventricle</td>
<td>diplopia</td>
<td>ND</td>
<td>high, enhanced</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>28/M</td>
<td>third ventricle</td>
<td>Parinaud’s syndrome</td>
<td>ND</td>
<td>high, enhanced</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>22/M</td>
<td>pineal</td>
<td>visual acuity</td>
<td>ND</td>
<td>high, enhanced</td>
<td>ND</td>
</tr>
<tr>
<td></td>
<td>17/M</td>
<td>pineal</td>
<td>photophobia</td>
<td>ND</td>
<td>high, enhanced</td>
<td>ND</td>
</tr>
<tr>
<td>Gotoda et al. (1996)⁴</td>
<td>21/M</td>
<td>suprasellar</td>
<td>visual acuity</td>
<td>ND</td>
<td>solid and cystic, Gd(+)</td>
<td>iso T₁, high T₂</td>
</tr>
<tr>
<td></td>
<td>21/M</td>
<td>suprasellar</td>
<td>visual field and acuity</td>
<td>ND</td>
<td>solid, Gd(+)</td>
<td>PLAP(+)</td>
</tr>
<tr>
<td></td>
<td>14/F</td>
<td>temporal</td>
<td>headache, convulsion</td>
<td>ND</td>
<td>solid and cystic, Gd(+)</td>
<td>iso T₁, high T₂</td>
</tr>
<tr>
<td></td>
<td>16/F</td>
<td>suprasellar</td>
<td>visual acuity</td>
<td>ND</td>
<td>solid and cystic, Gd(+)</td>
<td>iso T₁, Gd(+)</td>
</tr>
<tr>
<td>Konno et al. (2002)⁶</td>
<td>8/M</td>
<td>suprasellar</td>
<td>visual acuity</td>
<td>AFP(−), HCG(−), CEA(−)</td>
<td>ND</td>
<td>PLAP(−)</td>
</tr>
<tr>
<td>Endo et al. (2002)⁵</td>
<td>12/M</td>
<td>intrasellar</td>
<td>diabetes insipidus, bitemporal hemianopsia</td>
<td>ND</td>
<td>iso T₁, iso T₂, Gd(+)</td>
<td>ND</td>
</tr>
<tr>
<td>Present case</td>
<td>20/M</td>
<td>pineal</td>
<td>diplopia</td>
<td>AFP(−), HCG(−), PLAP(−)</td>
<td>high, enhanced</td>
<td>solid, Gd(+)</td>
</tr>
</tbody>
</table>


References


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