Chordoid meningioma with polyclonal gammopathy

Case report

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The authors present a case of chordoid meningioma in a 55-year-old woman who manifested headache and personality change. Magnetic resonance imaging of the brain and cerebral angiography demonstrated a mass in the right frontal lobe that resembled a typical convexity meningioma. However, the pathological diagnosis was chordoid meningioma, a rare subtype of this tumor that usually occurs in adolescence and is known to be associated with Castleman syndrome. A meningothelial meningiomatous pattern suggestive of a meningothelial origin was focally present, and cytokeratin-positive squamoid cells were noted in the tumor. The lesion lacked dense infiltration of lymphocytes and plasma cells. Polyclonal gammopathy was the only sign of Castleman syndrome and hypochromic microcytic anemia was absent in this case. Polyclonal gammopathy resolved completely 6 months after total removal of the mass.

KEY WORDS • meningioma • Castleman syndrome • gammopathy

Twen ty years ago, Connors reported a case of brain tumor in a 15.5-year-old boy with retarded somatic and sexual development, hepatosplenomegaly, iron-refractory hypochromic microcytic anemia, and bone marrow plasmacytosis with dysgammaglobulinemia (Castleman syndrome). The patient underwent subtotal removal of the lesion and postoperative radiotherapy, and subsequently Castleman syndrome disappeared. However, a histological diagnosis of the brain tumor was not made at that time. Kepes, et al., presented six additional cases with histological and clinical features similar to those in the case reported by Connors. They named the tumors “chordoid meningiomas,” which were characterized by occurrence in adolescence, presence of a chordoma-like histological appearance with lymphoplasmacellular infiltrations, and association with Castleman syndrome. Chordoid meningioma was included in the WHO classification of brain tumors as a subtype of the meningioma category, and to date 13 cases have been reported.

We report on a case of chordoid meningioma that occurred in a 55-year-old woman in whom polyclonal gammopathy was the only sign of Castleman syndrome. Occurrence at an unusually old age and polyclonal gammopathy without anemia were the characteristic findings compared with previous cases. Evolution of polyclonal gammopathy after the operation was also present.

Case Report

History. This 55-year-old woman was admitted to our hospital for evaluation of headache and personality change. Six months before her admission, memory disturbance, disorientation, and urinary incontinence developed insidiously. At first her family considered her symptoms to be indicative of presenile dementia. However, the patient later began to complain of headache as well. Her medical and family history were unremarkable.

Examination. The patient’s general appearance was normal except for a mildly vacant expression. There were no abnormalities in somatic or genital development, and internal organs including liver and spleen were normal on physical examination. No peripheral lymph node was palpated. Verbal communication was possible, but her speech was sometimes incoherent. Results of routine laboratory examinations including complete blood count, urinalysis, and a test for bleeding tendency were normal. However, liver function testing revealed a reversed albumin/globulin ratio (total protein 7.4 g/100 ml, albumin 3.2 g/100 ml). Subsequent serum protein electrophoresis revealed an increase in the gammaglobulin fraction to 30.2% (normal range 13.6–21.8%), indicating polyclonal gammopathy. Chest radiography and ultrasonography of the abdomen revealed no abnormality, whereas MR imaging of the head demonstrated a homogeneously well-enhancing large mass with surrounding edema in the right frontal area (Fig. 1). Cerebral angiography revealed a mass with highly vascular staining fed by both the internal and exter-

Abbreviations used in this paper: EMA = epithelial membrane antigen; MR = magnetic resonance; WHO = World Health Organization.
Chordoid meningioma

Cranial carotid artery systems. The preoperative diagnosis was convexity meningioma in the right frontal area.

**Operation.** A frontotemporal craniotomy was performed and the mass was found to be attached to the convexity dura mater with no invasion of the adjacent brain tissues. Total removal of the mass was performed without difficulty, and the immediate postoperative clinical course was uneventful.

**Histopathological Findings.** The resected tumor measured 6.5 × 6.5 × 4.5 cm, and the cut surfaces were pinkish gray and somewhat myxoid. Histologically, the tumor was characterized by an abundant myxoid matrix. Although some areas were solid enough to suggest a meningothelial pattern of meningioma, the larger portions of the tumor tissue consisted of looser zones with myxoid matrix and clusters of cells that had small or large intracellular vacuoles (Fig. 2). The cells appeared spindle- or multipolar- and formed clusters and rows in patterns that resembled chordomas. Unlike the chordoid meningiomas hitherto described, dense infiltrations of lymphocytes and plasma cells were absent. Marked nuclear pleomorphism was noted focally. Mitoses were noted at up to two per 10 high-power fields in the most active areas. Intravascular tumor emboli were also present in the dura. However, brain parenchymal invasion was absent (Fig. 3). Immunohistochemical studies revealed that the tumor cells expressed EMA diffusely and cytokeratin focally, but not S-100 protein. The cytokeratin-positive cells possessed abundant cytoplasm compared with cytokeratin-negative tumor cells. Squamoid cells with abundant thick cytoplasm were scattered in the tumor, and these cells were suspected of expressing cytokeratin (Fig. 4). Immunohistochemical studies also revealed that the Ki-67 proliferative index of the tumor was 10%. Immunostaining of p53 protein was occasionally noted in fewer than 1% of tumor cells. On the basis of these findings, a histological diagnosis of chordoid meningioma was made.

**Postoperative Course.** Complete resolution of neurological symptoms was found at the 1-month follow-up review and the patient’s gammaglobulin level had normalized at the 6-month follow-up. Serum protein electrophoresis follow-up data in this patient is summarized in Fig. 5.

**Discussion**

**Literature Review**

Meningioma is a common intracranial tumor that occurs usually in the fifth and sixth decades of life and accounts for approximately 15% of primary central nervous system tumors. The first histological classification of meningioma was made in 1938 by Cushing and Eisenhardt, and thereafter, many revisions of the classification system have been made by different authors. In the WHO classification of brain tumors published in 1993, which is the most recent and accepted worldwide, several new variants such as microcystic, secretory, clear-cell, lymphoplasmacyte-rich, metaplastic, and chordoid subtypes were included in the classification of meningioma. Chordoid meningioma is a rare variant of the tumor that occurs in adolescence and shows systemic symptoms of Castleman syndrome. Thirteen cases of chordoid meningioma have been reported, and these cases are summarized in Table 1.

**Histological Findings**

The histological appearance of chordoid meningioma is characterized by its resemblance to chordoma on light microscopy studies. Compared with the chordoid meningioma hitherto described, the histopathological characteristics of this case were as follows: first, a meningothelial pattern was noted focally; second, cytokeratin-positive squamoid cells were present; and third, the tumor lacked dense infiltration of lymphocytes and plasma cells.

Differentiation from chordoma can be established from the location of the tumor and the immunohistochemical findings. Chordoma is usually located in midline structures such as the clivus or sellar area, but chordoid meningioma is not closely associated with the midline. Immunohistochemical staining for EMA, vimentin, and cytokeratin is strongly positive and that for S-100 protein is partially positive in chordoma. In chordoid meningioma, immunohistochemical staining for EMA and vimentin is positive and that for cytokeratin and S-100 protein is negative. In our case, the tumor cells expressed EMA diffusely and cytokeratin focally. Squamoid cells with abundant thick cytoplasm expressed cytokeratin; however, most tumor cells were negative for cytokeratin. In addition, the focal presence of a meningothelial meningiomaticous pattern indicates that chordoid meningiomas originate from meningothelial cells.
Another differential diagnosis that can be established using histopathological studies is extraneural chordoid sarcoma (extraskeletal myxoid chondrosarcoma). Generally, chordoid meningioma is distinguished from extraneural chordoid sarcoma by the patient’s age at occurrence, which is much older. The histopathological pattern of extraneural chordoid sarcoma features more anaplasia and more marked lymphoplasmacellular infiltrations than that of chordoid meningioma. In this case, differentiation from extraneural chordoid sarcoma was made on the basis of the pathological findings that some areas of the tumor were solid enough to establish a meningothelial pattern of meningioma and also that the tumor cells expressed EMA and cytokeratin but not S-100 protein.

Castleman Syndrome

In 1954 and 1956 Castleman and colleagues reported cases of mediastinal lymphoid masses resembling thymic tissue, which contained bodies reminiscent of Hassall’s corpuscles that represented vascular structures involving lymph follicles. Castleman named this lesion an “angiofollicular hyperplasia” of the lymph node (Castleman disease). Keller, et al., reported that localized Castleman disease had a benign clinical course and subdivided it into...
hyaline-vascular and plasma cell types. Thereafter, extrathoracic angiofollicular hyperplasia of lymph nodes began to be reported. In 1965, Lee, et al. reported cases of plasmacellular types of Castleman disease accompanied by iron-refractory hypochromic anemia. In 1968, Lurthi, et al. and the next year Neerhout, et al. reported subsequent cases with other systemic manifestations like growth failure and hyperglobulinemia. In 1980, Connors reported a case of brain tumor in a 15.5-year-old boy with retarded somatic and sexual development, hepatosplenomegaly, iron-refractory hypocromic microcytic anemia, and bone marrow plasmacytosis with dysgammaglobulinemia (Castleman syndrome). The patient underwent subtotal removal of the lesion and postoperative radiotherapy, and Castleman syndrome then disappeared. However, the histological diagnosis of the brain tumor was not made at that time. In 1988, Kepes, et al. presented six additional cases with histological and clinical features similar to those in the case reported by Connors, and they named these tumors chordoid meningiomas. These lesion were characterized by occurrence in adolescence, a chordoma-like histological appearance with lymphoplasmacellular infiltrations, and an association with Castleman syndrome. Chordoid meningioma was included as a new category in the recent WHO classification of brain tumors as a subtype of meningioma. Thirteen cases of chordoid meningioma have been reported to date, and these cases showed similar clinical features. Among the signs of Castleman syndrome, hypocromic microcytic anemia was found in all the reported cases of this disorder; however, our patient did not have anemia. The cause of Castleman syndrome in chordoid meningiomas is still unknown; however, immunological host reactions to the tumor were suggested by Kepes, et al. The disappearance of Castleman syndrome and the lymphoplasmacellular infiltrations into the tumor might be evidence to support the theory that antigenic stimulation in the host by the tumor is the origin of systemic manifestations. The case we re-

**TABLE 1**

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Patient Age (yrs), Sex</th>
<th>Location of Tumor</th>
<th>Systemic Effects</th>
<th>Postop Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kepes, et al., 1988</td>
<td>15.5, M</td>
<td>lt tentorium involving cerebellum &amp; straight sinus</td>
<td>iron-refractory anemia, hepatosplenomegaly, dys, retarded somatic &amp; sexual development</td>
<td>5 yrs postop: normal in every aspect</td>
</tr>
<tr>
<td></td>
<td>19, F</td>
<td>rt temporal convexity</td>
<td>hypocromic anemia</td>
<td>3 yrs postop: in good health</td>
</tr>
<tr>
<td></td>
<td>10, M</td>
<td>rt parietal convexity</td>
<td>microcytic anemia</td>
<td>3 yrs postop: normal</td>
</tr>
<tr>
<td></td>
<td>18, F</td>
<td>rt tentorium</td>
<td>microcytic anemia</td>
<td>2 yrs postop: improved</td>
</tr>
<tr>
<td></td>
<td>17, M</td>
<td>rt parietal falx</td>
<td>microcytic hypocromic anemia</td>
<td>3 yrs postop: normal</td>
</tr>
<tr>
<td></td>
<td>16, F</td>
<td>lt occipital falx</td>
<td>microcytic hypocromic anemia</td>
<td>4 mos postop: normal; 20 mos postop: local recurrence</td>
</tr>
<tr>
<td></td>
<td>8, F</td>
<td>lt falx</td>
<td>microcytic hypocromic anemia</td>
<td>6 mos postop: normal</td>
</tr>
<tr>
<td>Glasier, et al., 1993</td>
<td>15, F</td>
<td>tentorium</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Kumar, et al., 1996</td>
<td>5, M</td>
<td>frontal, both sides</td>
<td>—</td>
<td>died after discharge</td>
</tr>
<tr>
<td>Civit, et al., 1997</td>
<td>21, F</td>
<td>tuberculum sellae</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Kobata, et al., 1998</td>
<td>15, F</td>
<td>rt falcotentorium</td>
<td>microcytic hypocromic anemia</td>
<td>2 yrs postop: normal</td>
</tr>
<tr>
<td>Kajiwara, et al., 1999</td>
<td>52, M</td>
<td>lt temporal convexity</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Shino, et al., 1999</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

* Dys = dysgammaglobulinemia; Hb = hemoglobin; — = data not available.
port occurred in the sixth decade of the patient’s life, and of the documented signs of Castleman syndrome, she exhibited only polyclonal gammopathy, which is considered a kind of response to immune stimulation. We believe that in this patient her relatively old age might have caused the different host reaction. In discussing the immune response in relation to the patient’s age, Kepes, et al., stated that older individuals seem to be less susceptible to systemic effects of Castleman syndrome than younger ones.

Conclusions

Chordoid meningioma must be included in the preoperative differential diagnosis of brain tumor featuring only polyclonal gammopathy, even in an older patient, although the incidence of chordoid meningioma is quite low in this age group. The clinical outcome is favorable, and systemic manifestations also resolve after removal of the mass.

References


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