Intraparenchymal meningioma in a child

Case report and review of the literature

SELHAN KARADERELER, M.D., FUGEN AKER, M.D., AND ZAFER BERKMAN, M.D.

Departments of Neurosurgery and Pathology, Haydarpasa Numune Training and Research Hospital, Istanbul, Turkey

The authors reported a rare case of temporal intraparenchymal meningioma without dural attachment. A 14-year-old boy presented with a 4-month history of generalized tonic–clonic seizures. Neurological examination showed no abnormality. Magnetic resonance (MR) imaging revealed an anteromedial temporal mass, which appeared to be totally intraaxial and caused peritumoral white matter edema. The tumor was hypointense on T1-weighted and hyperintense on T2-weighted MR images, and enhanced heterogeneously after Gd-diethylenetriamine pentaacetic acid administration. Gross-total excision of the tumor was accomplished. Histopathological examinations indicated that the lesion was a meningioma. The outcome was favorable. The patient has returned to baseline activities without sequelae or epilepsy. Magnetic resonance images revealed no residual tumor during a 3-year follow-up period. In this report, the authors review the literature and discuss intraparenchymal meningiomas in the differential diagnosis of intraaxial lesions.

KEY WORDS • brain tumor • meningioma • pediatric neurosurgery

MENINGIOMAS represent approximately 15% of primary intracranial tumors in adults. In children, however, they account for only 1 to 2% of primary lesions.1,3,15 Intraparenchymal meningiomas without dural attachment and surrounded by brain tissue are extremely rare and have been reported only occasionally in the literature.8–10,13–15,18,19

In this study, we discuss a rare case of intraparenchymal meningioma and compare our data with those obtained in previously published cases. Clinical presentation, radiological features, pathological factors, and classification of these tumors are discussed.

Case Report

Presentation. This 14-year-old boy presented with headache and history of generalized seizures. Four months before presentation, the patient suffered a seizure and during a week-long period of investigation, seizures recurred six times. There was no history of seizure activity after the administration of carbamazepine medication.

Examination. Neurological examination showed no abnormality. Magnetic resonance imaging revealed an anteromedial round temporal mass, which appeared to be totally intraaxial, and caused peritumoral white matter edema. Coronal and axial MR images revealed no dural attachment. The mass measured approximately 15 mm in diameter. The tumor was slightly hypointense, compared with brain tissue, on T1-weighted, and hyperintense on T2-weighted MR images, and enhanced heterogeneously after Gd-diethylenetriamine pentaacetic acid administration (Fig. 1).

Operation. The patient underwent a right temporal craniotomy. Dural structures and cortical surfaces were normal. After making a cortical incision, a well-circumscribed, tan-pink tumor was observed. The neoplasm was totally removed.

Histopathological Examination. Histopathological examination revealed a neoplasm that showed ill-defined borders with adjacent brain parenchyma. The tumor was composed of neoplastic syncytial cells that formed focally meningeal whorls. Tumor cells showed oval nuclei and a fine chromatin pattern with wide eosinophilic cytoplasm and intranucleolar inclusion. The surrounding cortex showed widely dispersed calcification with reactive gliosis. Ependymal or pial tissue was not observed in surgical specimens (Fig. 2).

Postoperative Course. The patient’s postoperative course
was uneventful. Outcome was favorable. The patient has returned to normal activities without sequelae or epilepsy. Follow-up MR imaging revealed no residual tumor 3 years after surgery (Fig. 3).

Discussion

It is believed that intraparenchymal meningiomas arise from arachnoid cells of the pia mater, which supplies the perforating blood vessels as they enter the surface of brain or sulci. Whereas the term intraparenchymal is used to describe tumors that arise within the brain tissue, it also has been used to characterize meningiomas that are not dural based. The key feature in the neuroimaging-based diagnosis of intraparenchymal compared with dural meningioma is the absence of dural attachment.

Meningiomas in children are quite rare, comprising only 1 to 2% of intracranial tumors. The most common locations for childhood meningiomas are the following: convexity (50%), temporal (17%), lateral ventricles (17%), and the falx–tentorial junction (17%). Typical locations where a meningioma may develop without dural attachment include the intraventricular region, pineal region, and within the sylvian fissure. Furthermore, other characteristics such as cyst formation, absence of dural attachment, presence of peritumoral edema and sarcomatous lesions have been relatively common in childhood meningiomas; thus, it is often difficult in the preoperative diagnosis to distinguish meningioma from high-grade glioma, cavernous angioma, or metastatic brain tumors. On the MR images obtained in the present case, peritumoral edema was observed in surrounding brain tissue, but cyst formation, sarcomatous differentiation, or association with temporal horn of lateral ventricle and choroidal fissure were absent.

All available cases of intraparenchymal meningiomas are summarized in Table 1; primary sylvian fissure meningiomas and meningiomas secondary to underlying meningioangiomatosis are excluded. In the English-language literature, only 11 cases, including ours, of intraparenchymal meningioma in children have been reported.
meningiomas have been reported.8–10,13–15,18,19 The most common symptom we observed in the literature review was seizure, and its prevalence in children was high (nine children compared with two adults). Although in larger series in which fibromatous meningiomas have constituted 6.6 to 27% of all meningiomas,2,7,17 this type was

![Fig. 2. Upper and Lower: Microscopic appearance of the meningioma showing neoplastic syncytial cells that formed focally meningeal whorls. H & E, original magnification \( \times 40 \) (upper); \( \times 200 \) (lower).](image1)

![Fig. 3. Postoperative axial (upper) and coronal (lower) MR images revealing absence of tumor.](image2)

**TABLE 1**
**Summary of cases involving intraparenchymal meningiomas in the literature***

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Age (yrs), Sex</th>
<th>Localization of Lesion</th>
<th>Clinical Presentation</th>
<th>Imaging</th>
<th>Mode/Detail w/ Contrast</th>
<th>Op</th>
<th>Tissue Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sano, et al., 1981</td>
<td>0–14, NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>0–14, NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>15–19, NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Legius, et al., 1985</td>
<td>1, M</td>
<td>parietal</td>
<td>seizure</td>
<td>CT, edema</td>
<td>yes</td>
<td>craniotomy</td>
<td>fibromatous</td>
</tr>
<tr>
<td>Schroeder, et al., 1987</td>
<td>7, M</td>
<td>frontal</td>
<td>seizure</td>
<td>CT, MRI</td>
<td>no</td>
<td>craniotomy</td>
<td>fibroblastic</td>
</tr>
<tr>
<td>Mamouriian, et al., 1991</td>
<td>2, F</td>
<td>frontal</td>
<td>macrocephaly</td>
<td>CT, calcification, cystic</td>
<td>yes</td>
<td>craniotomy</td>
<td>fibromatous, psammomatous</td>
</tr>
<tr>
<td>Kohama, et al., 1996</td>
<td>2, F</td>
<td>frontal</td>
<td>seizure</td>
<td>CT, MRI</td>
<td>yes</td>
<td>craniotomy</td>
<td>fibroblastic</td>
</tr>
<tr>
<td>Sanli, et al., 1996</td>
<td>23, M</td>
<td>frontal</td>
<td>seizure</td>
<td>MRI</td>
<td>no</td>
<td>craniotomy</td>
<td>psammomatous</td>
</tr>
<tr>
<td>Teo, et al., 1998</td>
<td>2, F</td>
<td>brainstem</td>
<td>hemiparesis</td>
<td>MRI</td>
<td>yes</td>
<td>craniotomy</td>
<td>clear cell</td>
</tr>
<tr>
<td>Wada, et al., 2000</td>
<td>45, F</td>
<td>parietal</td>
<td>sensory disorder</td>
<td>CT, MRI, cystic, edema</td>
<td>yes</td>
<td>craniotomy</td>
<td>chordoid</td>
</tr>
<tr>
<td>present case</td>
<td>14, M</td>
<td>temporal</td>
<td>seizure</td>
<td>MRI, edema</td>
<td>yes</td>
<td>craniotomy</td>
<td>fibromatous</td>
</tr>
</tbody>
</table>

* CT = computerized tomography; NS = not stated.
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reported six of 10 cases. In contrast to its usual preponderance in females in the adult population (2:1 female/male ratio in intracranial meningiomas and 4:1 in spinal meningiomas), a 1:1 sex ratio was also observed (Table 1).

In conclusion, intraparenchymal meningiomas have only occasionally been reported in the literature. These neoplasms should be considered in the differential diagnosis of intraaxial lesions in patients of any age group.

References


Address reprint requests to: Selhan Karadereler, M.D., Yeniyol sok., Gunaltay Apt., 8/25, 81080, Erenkoy, Istanbul, Turkey. email: selhankaradereler@hotmail.com.