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Case Report

A Rare Tumor in Childhood Desmoplastic Infantile Astrocytoma: Two Case Reports

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Abstract

Desmoplastic infantile astrocytomas (DIAs), are rare supratentorial tumors, usually observed in the first 24 months of life. Despite their aggressive appearance, they tend to follow a favorable clinical course. Total or near total resection of tumor is usually the treatment option. Desmoplastic Infantile Ganglioglioma (DIG) and DIA are WHO grade I tumors that have similar clinical and morphological findings. The only criterion in differential diagnosis is the neural component of DIG. These tumors both have dense fibroblastic stroma and positive staining with glial fibrillar acidic protein (GFAP) and CD34.

A rare case of desmoplastic infantile astrocytoma presenting with right side partial seizures presented in a 1-year-old child.

A rare case of desmoplastic infantile astrocytoma presenting with focal onset generalized seizures presented in a 1-year-old child.

Despite their radiological and histological properties, these tumors have a benign course. After 3-year follow-up for the first case and 1-year follow-up for the second case, there was no recurrence.

Keywords: Desmoplastic infantile astrocytoma; favorable prognosis; supratentorial.

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Desmoplastic infantile astrocytomas (DIAs) are rarely observed. They are mostly benign, WHO grade 1 tumors generally observed in infants. Despite their radiologically aggressive appearance, they are benign and have good prognosis even after subtotal excisions.[1] They are believed to originate from subpial astrocytes.[1, 2] They usually manifest in infants within the first 2 years of their life, most often at 3–6 months with an increase in head diameter, seizures, and symptoms of paresis. They are primarily located in the frontal lobe followed by parietal and temporal lobes. They contain solid-cystic components and compress ventricules. In most cases, complete or near-complete surgical removal of the tumor is sufficient for treatment.[1, 2] In this article, 2 cases with this rare tumor were presented.

Case Reports

Case 1- No neurological deficit was detected on the first neurological examination performed in 1- year-old female patient who was referred with complaints of contractions in the right arm and right leg. In the case that was clinically assessed as simple partial seizure, cranial magnetic

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resonance imaging (MRI) revealed edema, a 5×5×4 cm multicystic mass with solid component, and heterogeneous contrast uptake on the left parietofrontal lobe that extended to the ventricle was detected. The mass of the patient was totally surgically resected. Control MRIs obtained during the 3-year follow-up period did not reveal any evidence of recurrence.

Case 2- A 1-year-old boy was referred to our neurology department upon onset of generalized convulsions. No neurological deficit was detected in the first neurological examination performed in the patient who had a generalized seizure with focal onset. On cranial MRI edema, a giant mass of 7×5×2 cm adjacent to the brain stem with heterogeneous contrast uptake, and solid component extending from the left temporal lobe to the lateral ventricle was detected. The tumor mass was totally surgically resected. During 1-year follow-up, no tumor recurrence was observed.

In both cases, hematoxylin & eosin stained serial sections showed tumoral infiltration of small astrocytes with elongated nuclei. Astrocytes were dispersed in a desmoplastic stroma comprising collagen-rich short fibroblasts (Figs. 1, 2). Stroma rich in reticulum and collagen fibers that specifically stained with reticulin and Masson trichrom dye were observed (Fig. 3). Neural component, mitosis, necrosis, and vascular endothelial proliferation were not observed in the sections. Pediatric glioblastoma was excluded from diagnosis. In the immunohistochemical study, neoplastic astrocytes were positively stained with GFAP (Fig. 4) and S100. Astrocytes did not stain with synaptophysin, chromogranin A, and EMA. Therefore, DIG and meningioma were not considered in the differential diagnosis. Ki 67 proliferation index was less than 2%. Immunohistochemical p53 overexpression was not observed in all 2 cases. TP53 mutation was not investigated in molecular analysis. CD34 staining was observed in fibroblastic cells and vascular structures. Histomorphological, histochemical, and immunohistochemical findings were evaluated and the patient was diagnosed with desmoplastic infantile astrocytoma.

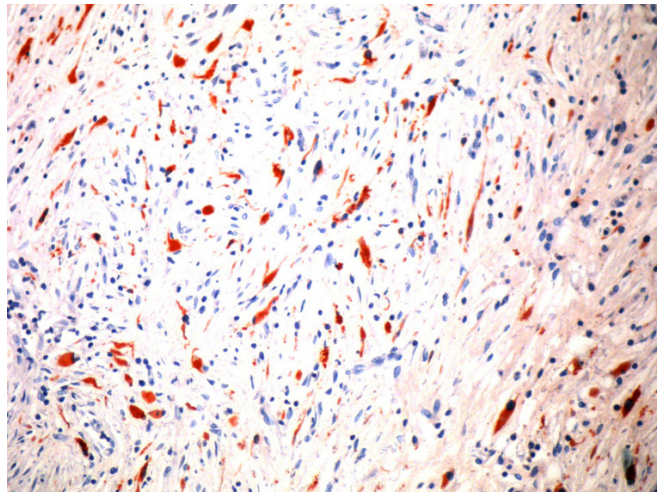

Figure 2. GFAP (+) Astrocytic cells, 100X.

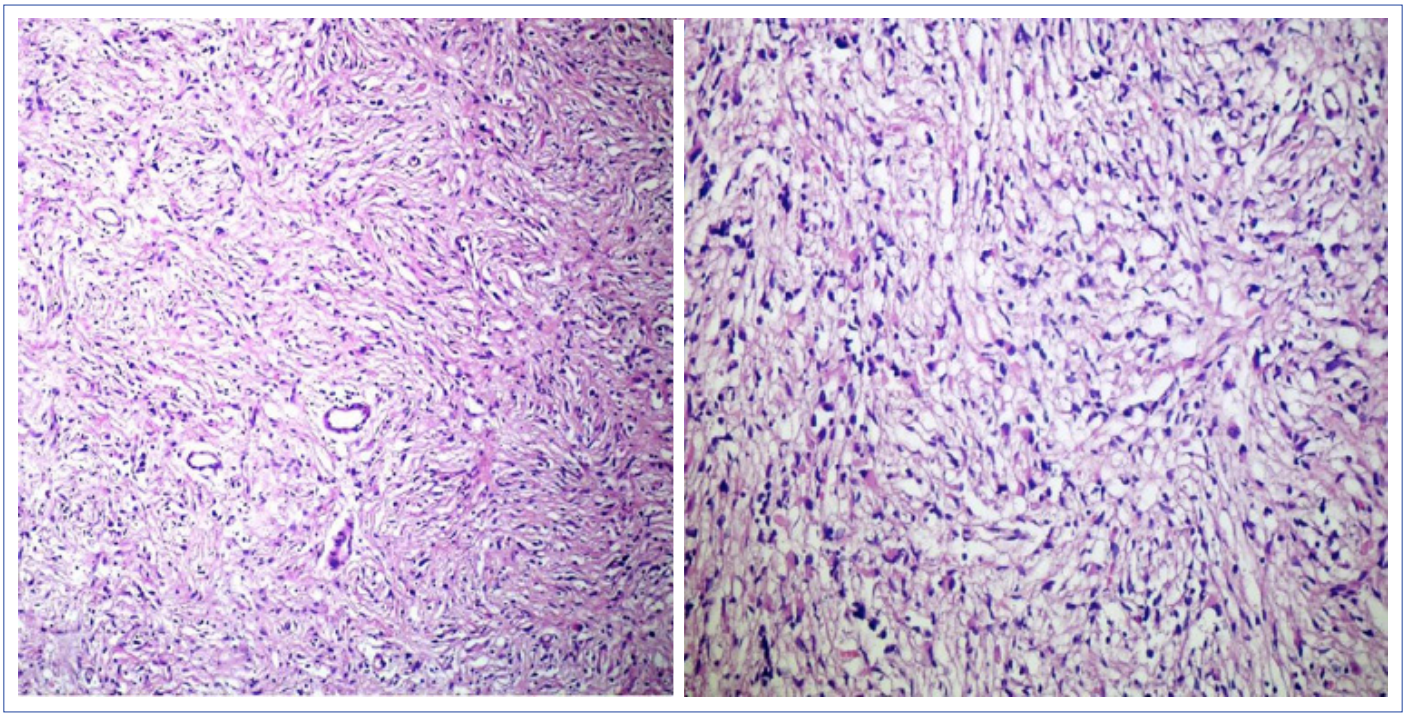

Figure 1. Astrocytic cells dispersed in fibroblastic stroma (Hematoxylin & Eosin stain A:X40 B:X100).

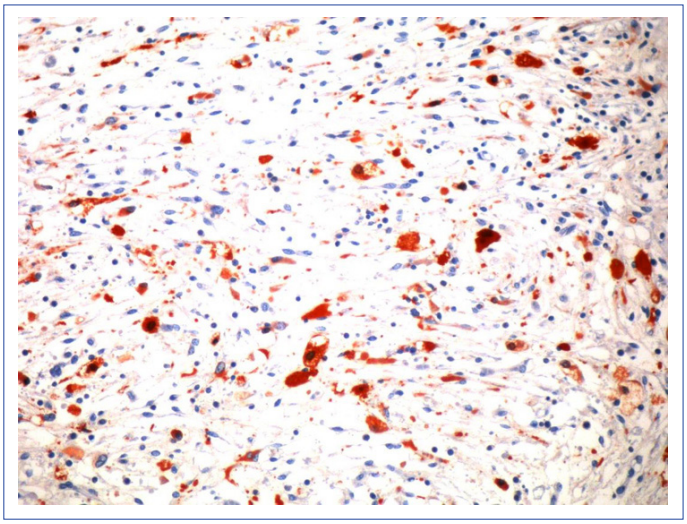

Figure 3. CD34 (+) fibroblastic cells, 100X.

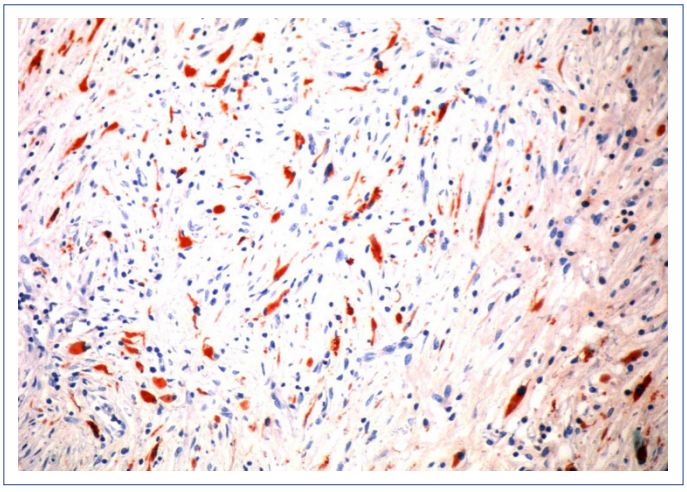

Figure 4. S-100 (+)Astrocytic cells (+), 100X.

Discussion

DIA is a rare tumor, usually seen in patients less than 2 years of age, which is also reported in non-infantile cases.[1-6] It occurs more frequently in boys.[7, 8] One of the patients in the present study was a girl and the other was a boy. Their frontal and temporal localizations were consistent with the literature. It yields clinical manifestations most frequently caused by increased head circumference and fontanel tension, and because of the increase in intracranial pressure focal neurological deficits, hemiparesis, seizures may occur. Radiologically, the DIAs are supratentorially localized tumors with distinct contrast enhancement, settled on dura with large solid and cystic components

Spinal cord involvement and/or multiple lesions have been reported in the literature.[9-13] MRI findings showed the localization of solid component on the periphery, which was mostly isointense in T1W and T2W images. The cystic component was hypointense at T1W and hyperintense at T2W images.[9, 14] Radiologically, desmoplastic infantile ganglioglioma (DIG), primitive neuroectodermal tumor (PNET), pleomorphic xanthastrocytoma (PXA), meningioma, low-grade astrocytoma, solitary fibrous tumor (PFT), pediatric gliosarcoma (GS), and ependymoma should be considered in differential diagnosis.[8, 9]

DIG and DIA are WHO grade 1 tumors that demonstrate similar clinical and morphological findings. The absence of neural component in DIA is the only criterion in differential diagnosis. Auxiliary immunohistochemical studies using antibodies such as synaptophysin, chromogranin A, and neurofilament may demonstrate the lack of neural component.

PXA, which is considered in the differential diagnosis, is a WHO grade 2 supratentorial tumor with a solid-cystic component, commonly found in adolescents and adolescents. Despite their well-contained appearance, they frequently infiltrate the brain tissue. Pleomorphism, xanthomatous changes, astrocytes, and neurons are the characteristic features of PXA. DIA is distinguished from PXA by its stromal fibroblastic properties.[12]

Meningiomas are the most common intracranial tumors and are observed in adults. Cases of DIA include early childhood tumors. They may occur anywhere on the neural axis, but are more frequently seen on meninges in cerebral convexity and parasagittal areas. Sometimes, the cystic area located at or near the lesion may cause "cystic-nodal configuration."

In fibrous meningiomas, collagen is stored in a dense, diffuse matrix mixed with thick bands and tumor cells along the blood vessels. They form fascicules or storiform patterns that may be accompanied with interposed whirlpool shaped structures and psammoma bodies. They are EMA and claudin-1 positive tumors. In cases of DIA, GFAP positivity and EMA negativity are the differential diagnostic features of the distribution pattern of astrocytic cells.[13]

Solitary fibrous tumor, another lesion in the differential diagnosis of DIA, is a meningeal tumor frequently seen in adults, especially in women. They show a clinical course without recurrence after total excision. They are dense collagenous, hypocellular lesions containing thick fascicles of spindle cells. Morphologically, it is difficult to differentiate them from fibrous meningiomas. In immunohistochemistry, diffuse CD34 positivity, EMA and S100 negativity aid in diagnosis. These tumors do not stain with glial fibrillary acidic protein (GFAP-negative).[14]

DIA and ependymomas may have common localizations among childhood tumors. Differential diagnosis may be made on the basis of their infiltrative properties, the pres-

ence of ependymal rosettes, and sclerotic features of matrix and stroma.[8, 18]

DIA may resemble low-grade astrocytomas in childhood. Lack of stromal collagenization, infiltrative pattern of astrocytomas, and their specific nuclear features are useful in differential diagnosis.[6, 16]

Pediatric GS and PNET group tumors with their intensive fibroblastic characteristics should be taken into consideration in the differential diagnosis of DIAs. While the infiltrative features of pediatric GS are defined by the presence of sarcomatous cell pattern, necrosis, and atypical mitoses, these findings are not observed in the DIA. However, p53 immunohistochemistry positivity is commonly observed in GS, while it is not seen in DIA.[6]

PNET cases have similar localizations and radiological findings. Morphologically, they are small-cell tumors with cell necrosis, atypical mitosis, and vascular proliferation and these features are not observed in DIA.[6, 16]

DIA usually has good prognosis. Because of its large size, adhesiveness to functional brain areas and the small age of the patient, complete resection may not be possible. In these cases, adjuvant chemotherapy and radiotherapy are added to the treatment regimen. Radiotherapy is recommended only in cases of chemotherapy failure and in patients older than 5 years.[15] Relapse has been reported after 3 months despite total resection of the tumor in a 6-week-old infant with an increase in mitosis in spindle cells and a Ki67 proliferation index of 25%.[16] In recent years, researches have been conducted concerning BRAF V600E mutation and new approaches to treatment.[17, 18]

Conclusion

When the DIA cases with different clinical courses are assessed, it is believed that new molecular studies to be developed in the coming years will further evolve treatment approaches.

Disclosures

Informed consent: Written informed consent was obtained from the parents of the patient for the publication of the case report and the accompanying images.

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