

Clinical Image

Malignant Astroblastoma

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In February 2013, a 23-year-old male was admitted to the hospital with headache. Cranial magnetic resonance imaging (MRI) showed a homogeneous, well-demarcated, hyperintense mass on T2-weighted imaging and peritumoral hyperintensity due to edema. The mass showed no enhancement on T1-weighted imaging with contrast (Fig. 1-A). Surgical resection was recommended. However, the patient rejected surgery. In 2016, he presented again with severe headache. MRI showed hemorrhage and herniation (Fig. 1-B). The patient underwent emergency surgery, but the mass could not be completely excised.

Morphologically this hypercellular neoplasm exhibited the following features. There were perivascular pseudo-rosettes with short, thickened cytoplasmic processes extending from cell bodies into the adventitia of vessels. In addition, there was vascular hyalinization with little fibrillar background and tumor necrosis with pseudo-palisading and high mitotic activity (Fig. 1-I). Immunohistochemically, glial fibrillary acidic protein (GFAP) was diffusely present in the epithelioid cells, mostly around the perivascular areas. The tumor cells showed a diffuse positivity for S-100 and vimentin, and focal positivity for Epithelial Membrane Antigen (EMA). The Ki-67 proliferation index was calculated as 60% (Fig. 1-J). In light of these findings the patient was diagnosed with a malignant astroblastoma.

On postoperative MRI residual tumor was evident behind the resection cavity (Fig. 1-C). Radiotherapy (RT) and concomitant temozolomide (TMZ) were started immediately subsequent to surgery. Six months after RT, a contrast enhancing lesion was noticed which was considered to be radiation necrosis (Fig. 1-D). A new, ring-enhancing focus was apparent nine months after surgery (Fig. 1-E) and by 12 months after surgery this focus had progressed (Fig. 1-F). Due to this evident lesion progression TMZ was changed to bevacizumab which resulted in decreased tumor enhancement (Fig. 1-G). However, new white matter intensities were detected. The patient's general condition became progressively worse, nine months after starting bevacizumab. The recurrent lesion enlarged rapidly and spread to the corpus callosum, basal ganglia and cerebral hemisphere white matter bilaterally (Fig. 1-H). This later image was obtained just prior to the patient's death in March 2018. Written informed consent for publication was obtained from the patient's father.

Astroblastomas are recognized as a separate entity from astroglial tumors and have been classified as "other gliomas" (1). Histological diagnosis is made based on the presence of typical features including astroblastic perivascular pseudo-rosettes and hyalinization in a relatively well-defined mass. These tumors contain epithelioid cells and vascular sclerosis is evident. Additional typical features include dot-like staining with EMA. The tumor usually stains positive with antibodies to GFAP, S-100 protein and vimentin. Tumors, listed as "other neuroepithelial tumors" in the World Health Organization (WHO) Classification, are graded as either a low-grade or malignant variant. Malignant astroblastomas were described as having high cellularity in either a focal or multiple foci pattern, anaplasia, increased mitotic activity [>5 mitoses per high power fields], elevated proliferative index ($>10\%$), microvascular proliferation and necrosis.

It is difficult to differentiate astroblastoma from other glial tumors, such as ependymoma, angiocentric glioma and glioblastomas. In ependymomas the tumor cells have small nuclei and are generally more fibrillar with true

rosettes while being less pleomorphic and sclerotic. Angiocentric gliomas are infiltrative neoplasms consisting of monomorphic bipolar spindle cells arranged in an angiocentric pattern. Although glioblastomas generally contain focal areas of perivascular pseudorosettes, differential diagnosis of high grade astroblastoma with glioblastomas is difficult. Genetic studies can help distinguish between these two neoplasms.

Histologically, astroblastomas overlap with glioblastoma and especially with lower grade gliomas. Studies have shown that even if histologically diagnosed as Astroblastoma, the tumor often has molecularly heterogeneous properties and does not represent a single entity. Clinical, radiological and histopathological correlations, and if necessary, genetic examination, are essential for accurate diagnosis (2).

Optimal treatment for astroblastomas is not yet clear. Gross total excision of the mass seems to be the most important variable that determines patient survival (3). In the literature postoperative RT and chemotherapy have shown variable but gross total resection and RT has been the recommended treatment options in the case of malignant astroblastoma (4-5).

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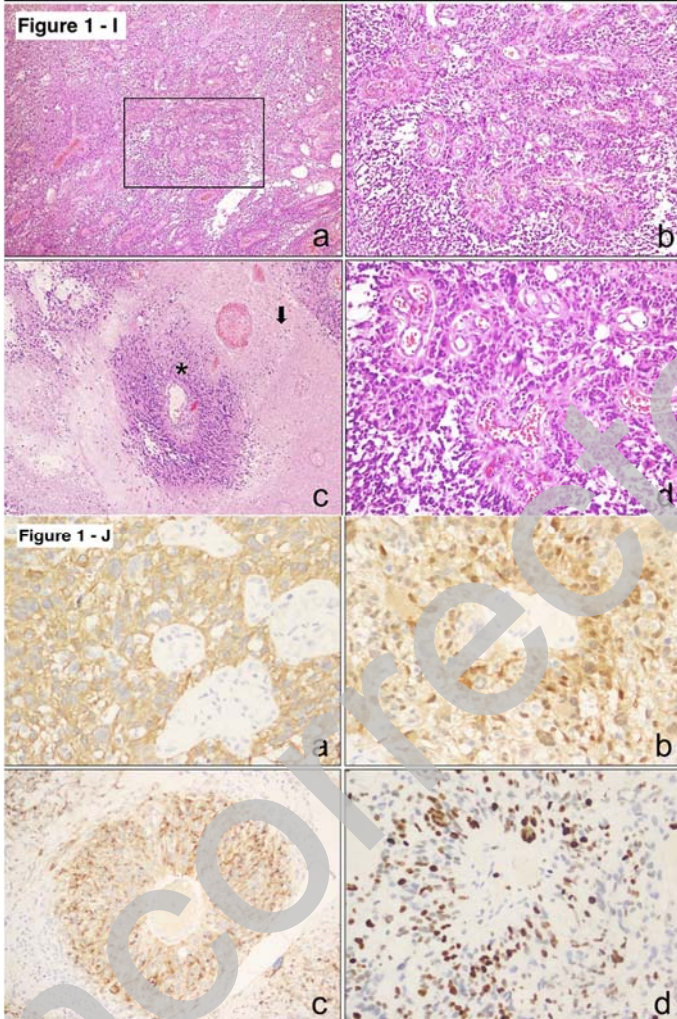
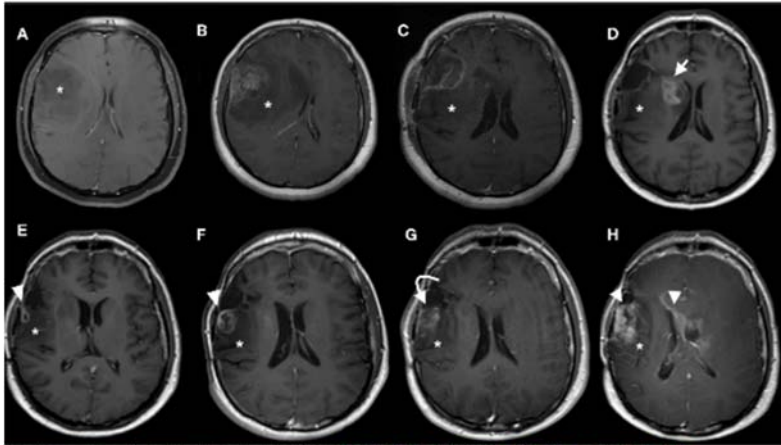


FIG. 1. Post-contrast axial T1-weighted images (Fig 1. A-H): (A) Mass on first admission (*). (B) Preoperative tumor (*). (C) Postoperative residual tumor (*). (D) Sixth month after treatment; residual tumor (*) and radiation necrosis (○). (E) Ninth month after treatment; lesion (○). (F) Twelfth month; progression. (G) Beginning of bevacuzimab therapy, pseudo-response (○). (H) After bevacuzimab therapy; rapid progression. Histopathological images (Fig 1. I - J): (I-a) Magnification x40, glial neoplastic cells, hematoxylin and eosin (H&E), (I-b) x100, Magnified area of continuous rectangular shape of image I-a, (I-c) x100, Perivascular pseudo-rosette (*) and necrotic area (○), (I-d) x200: Magnified from image I-b. (J) x200, Positive staining for GFAP (J-a), S-100 (J-b), EMA (J-c), Ki67 (J-d)