Bulky subependymal giant cell astrocytoma with profuse blood supply without tuberous sclerosis

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Subependymal giant cell astrocytoma (SEGA) is a rare, slow-growing, benign tumor (WHO grade I), typically seen in young patients under 20 years,[1] but can be found in infants and fetuses. It usually occurs in patients with tuberous sclerosis (TS). The SEGA is typically seen as a soft, less-vascularized tumor, located in the wall of the lateral ventricle, or near the foramen of Monro. Calcifications, cysts, and spontaneous hemorrhage have been observed. Although it rarely extends to the neighboring brain tissues, a large SEGA may cause increased intracranial pressure, seizures, and focal neurological signs. The SEGA often have a good prognosis and low recurrence.[2] Herein, we present a rare case of an adult patient with a bulky SEGA with profuse blood supply, but without TS, who died due to postoperative massive intraventricular hemorrhage originating from the tumor.

A 25-year-old man complained of daytime sleepiness and fatigue for one month with visual disturbance, dizziness without headache, and vomiting for 9 days. The physical examination showed that both pupils were enlarged up to 6 mm, and direct and indirect pupillary light reflexes were retarded, accompanied by bilateral papilledema. He had no significant medical history, or family history of major diseases such as cancer, cardiovascular, and hematological diseases. A CT and MRI performed on admission revealed an 8.0×6.0×5.5-cm solid-cystic tumor mass upon the third ventricle and moderate obstructive hydrocephalus without cortical nodules (**Figure 1**). The lesion was heterogeneous containing cysts and enlarged blood vessels. Both lateral cerebral ventricles were enlarged. The tumor was partially excised through the transcallosal approach. The tumor was fuchsia with abundant vascularization. External ventricular drainage was installed post-operatively. The patient died of massive left intraventricular hemorrhage 4 days after the operation. Microscopic examination showed that most of the tumor tissue was composed of cells arranged in compact bundles, trabeculae, and nests, with some of the cells being multi-nuclei. Perivascular palisading/pseudorosettes were also observed (**Figure 2**). Approximately 40% of the tumor vessels were significantly hyperplastic, which were hyperemic and angio-ectatic. No focal calcifications were found. Immunohistochemical studies showed a limited reaction for glial fibrillary acid protein in plump astrocytes positivity for S-100 protein, vimentin and neuron specific enolase in cluster-like arrangements of

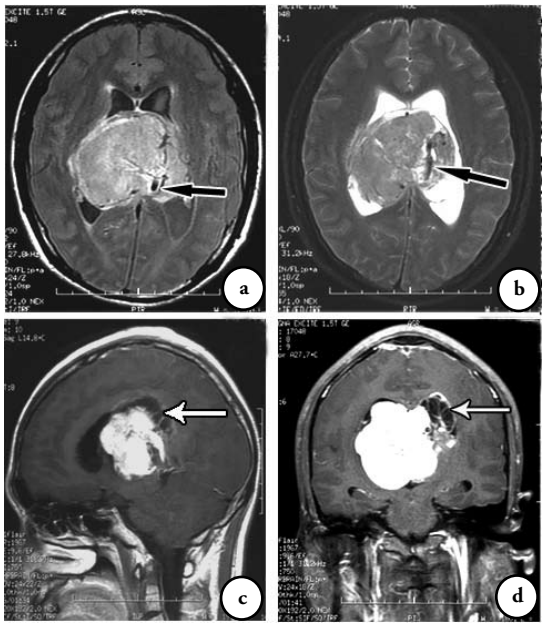

Figure 1 - Pre-operative brain MRI showing a 8.0×6.0×5.5-cm solid-cystic tumor mass upon the third ventricle and **a**) axial T1 flair, and **b**) axial T2-weighted brain MRI show heterogeneous signals with enlarged blood vessels (back arrow), **c**) sagittal contrast enhanced T1WI, and **d**) coronal contrast enhanced T1WI showed heterogeneous signals with cyst (white arrows).

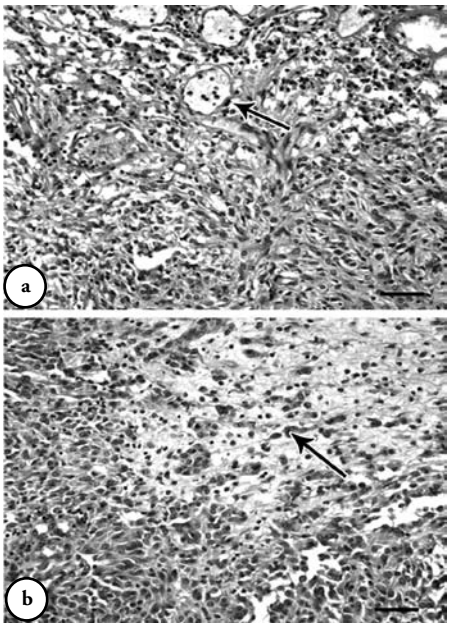

Figure 2 - Histopathology slides showing **a**) gemistocytic astrocyte-like cells forming stems, trabeculae, and nests. **b**) Ganglioid astrocytes with multi-nuclei. Some of them had spindle protuberance (arrows). Scale bar = 50 μm.

tumor cells, and a limited reaction for synaptophysin, cytokeratin-pan and p53. The labeling index of MIB-1(Ki-67) was approximately 7%.

Most cases of TS are diagnosed in infancy or early childhood.[1] Its major manifestations include cortical tubers, subependymal nodules, and subependymal giant cell and retinal astrocytomas. The SEGAs account for 0.16% of intracranial tumors, and 0.51% of all gliomas.[2] Patients' age ranges from the prenatal period to 75 years, with a male predominance.[2] The SEGAs can become aggressive, causing visual disturbances, epilepsy and obstructive hydrocephalus.[2] The SEGAs without TS are rare and described as "forme fruste" of TS. A PubMed literature search (publications in English from 1979 to 2009) revealed 12 case reports describing 41 patients with SEGA, but no stigmata of TS. The mean reported age at diagnosis was 22.8 years (range 4-75 years), with a male predominance (M:F 25:16). Patients had a variety of symptoms caused by hydrocephalus, and 11.9% (5/42) of the tumors were larger than 4 cm in diameter. In this subgroup, the mean age was 31.8 years (M:F 3:2). The first clinical symptoms were present during adulthood period (4/5). In our case, although the SEGA mass was large (8.0×6.0×5.5 cm), the patient had only moderate symptoms of obstructive hydrocephalus. Generally speaking, total tumor removal can result in a satisfactory prognosis in most SEGA patients. Only rarely, the SEGA can re-grow rapidly after partial removal of the tumor and the major parts of the recurrent tumor are composed of blood vessels.[3] Spontaneous intratumoral hemorrhage and even death may occur in SEGA patients (7/42). Surgical removal and external ventricular drainage are usually performed in patients with SEGA, using 2 different procedures, the frontal transcortical approach or the anterior transcallosal approach. The latter approach would reduce the risk of secondary seizures.[4]

Previous immunohistochemical studies have demonstrated a mixed glial and neuronal differentiation in SEGA.[3] In our case, the histological findings indicated a typical SEGA without any malignant features. Radiological and intraoperative findings revealed a bulky mass with profuse blood supply. As reported previously, a bulky SEGA with abundant blood supply may indicate a poorer prognosis.[3] A microscopic examination or genetic profiling may be needed to make a definite diagnosis of SEGA.[1]

There are limited studies reporting adjuvant therapies for SEGAs, with little success. Many investigators recommended that radiotherapy or chemotherapy should be avoided.[5] However, the benefits of preoperative embolization have been reported since the 1970s. With embolization of hypervascular tumors, surgical morbidity can be reduced due to decreasing blood loss, thereby shortening operating time, and increasing the chances for a complete resection. Therefore, preoperative embolization may be considered in patients with a huge SEGA with profuse blood supply.

In conclusion, the transcortical approach would be a good choice in cases of a huge SEGA with a profuse blood supply. Pre-operative endovascular management will help in improving the prognosis of such patients.

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