Exophytic giant cell glioblastoma of the medulla oblongata

Case report

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Gross cell glioblastoma is a rare variant within the spectrum of glioblastoma multiforme (GBM) tumors. A giant cell glioblastoma may be associated with a better prognosis than the common type of GBM after combined treatment involving tumor resection and radiochemotherapy. A giant cell glioblastoma may occur at various sites in the brain and spinal cord. To the authors’ knowledge, this type of tumor has not been previously reported as arising as an exophytic tumor from the medulla oblongata. The authors report on a 40-year-old man who presented with a large tumor located in the caudal fourth ventricle. The tumor was removed completely and the patient underwent percutaneous radiotherapy with 60 Gy and concomitant chemotherapy with temozolomide. Histopathological examination of the tumor revealed the typical features of a giant cell glioblastoma. At the 2-year follow-up the patient was doing well and showed no signs of tumor recurrence. It is important to identify variants of GBM because they may predict favorable long-term outcome, even when they arise from the caudal brainstem. (DOI: 10.3171/2008.8.JNS17644)

Key Words • brainstem • giant cell glioblastoma • glioblastoma multiforme • glioma • medulla oblongata

Malignant glial tumors are located most frequently in the cerebral hemispheres, the basal ganglia, or the diencephalon.10,13 Their manifestation within the posterior fossa in adults is rare, and only infrequently they exhibit exophytic growth patterns.4,6,17 In this paper, we report on the surgical treatment and outcome of a patient with a giant cell glioblastoma arising from the medulla oblongata with an exophytic growth pattern to the fourth ventricle. Although long-term patient survival has been described in association with giant cell glioblastoma before,9,14 to the best of our knowledge it has not been reported in a patient with a tumor in such an unusual location.

Case Report

History and Presentation. This 40-year-old man presented with a short history of progressive right-sided hemihypesthesia accompanied by headache and vomiting. Neurological examination of the patient showed an atactic gait disturbance, right-sided hemihypesthesia, and deviation of the tongue to the right. The patient suffered from sporadic hiccup.

Magnetic resonance imaging studies showed a polycystic tumor approximately 3 × 3.5 × 5 cm in size, which was located within the caudal fourth ventricle, extending through the foramen of Magendie to the C-1 level on the right side. Compression of the medulla oblongata, the upper spinal cord, and the right cerebellum was evident. The tumor showed irregular enhancement after administration of Gd-DTPA, with multiple intratumoral cysts (Fig. 1).

Operation and Postoperative Course. The tumor was approached via a median suboccipital craniotomy with additional removal of the C-1 arch while the patient was in a semisitting position. After a Y-shaped opening of the dura mater, a highly vascularized tumor was noted. Microsurgical total excision of the tumor was achieved with the aid of multimodal intraoperative electrophysiological monitoring. During this procedure the exophytic character of the tumor became apparent. The tumor was tightly adherent to the medulla oblongata but it could be removed safely in a stepwise fashion. Intraoperative histopathology suggested that the tumor was a malignant...
glioma. The dura was closed in a watertight manner using a galea-periosteal flap.

Histological examination of paraffin-embedded tumor specimens confirmed the diagnosis of a malignant glioma (Fig. 2). The cellular neoplasm was composed of numerous giant cells with broad eosinophilic cytoplasm and unusual bizarre hyperchromatic nuclei; between them, smaller cells were found. Focal necrosis, little mitotic activity, and focal capillary proliferation with endothelial hyperplasia were observed. Signs of previous bleeding with hemosiderophages were present. Immunohistochemistry demonstrated marked GFAP reactivity of the giant tumor cells, and a negative reaction of the smaller cells. Focal necrosis, little mitotic activity, and focal capillary proliferation with endothelial hyperplasia were observed. Signs of previous bleeding with hemosiderophages were present. Immunohistochemistry demonstrated marked GFAP reactivity of the giant tumor cells, and a negative reaction of the smaller cells. The proliferation rate determined by Ki 67 immunohistochemistry was 15%. Upregulation of p53 was immunohistochemically demonstrated in 80–90% of tumor cell nuclei. Staining for CD34 was negative in the tumor cells. Based on these histological results, a diagnosis of giant cell glioblastoma was made.

The postoperative course of the patient was uneventful. The patient did not have any additional neurological deficit; in particular, there was no evidence of dysfunction of caudal cranial nerves. After discharge from the hospital the patient underwent radiotherapy with an overall dose of 60 Gy over a period of 6 weeks. In parallel with this radiotherapy, the patient received temozolomide chemotherapy that was continued over 6 months. Both therapies were tolerated well and the patient reported no complaints. Follow-up MR imaging every 3 months confirmed tumor removal and did not show any recurrence (Fig. 3). At 2 years postoperatively the patient has recovered almost completely, and MR images continued to be unremarkable for tumor recurrence.

Discussion

Glioblastoma multiforme, the most malignant primary cerebral tumor, accounts for approximately 50% of all gliomas in adults. Contemporary treatment for GBMs is based on neurosurgical tumor excision or debulking followed by radiotherapy and temozolomide chemotherapy. Using this regimen, a better quality of life, longer disease-free survival times, and overall improved patient survival times have been achieved.

Giant cell glioblastoma, a variant of GBM, accounts for < 5% of all GBMs.11,14 These tumors are usually located supratentorially, mostly in the temporal lobe, and only rarely have they been reported infratentorially or within the spinal cord.5,12 These tumors have been diagnosed primarily in younger adults with a peak incidence in the age group under 20 years of age2 and in pediatric patients. A giant cell glioblastoma arising from the caudal brainstem has not been reported previously in adults.

Gliomas of the brainstem consist of a heterogeneous group of tumors. Various classification systems are being used for these tumors.5,6 In children, these tumors account for 10–20% of cerebral neoplasms,10 in contrast to adults in which they comprise only < 2%. In general, low-grade tumors of the brainstem occur predominantly at the age of 30 to 40 years, whereas the occurrence of malignant...
brainstem tumors peaks in the elderly from 60 years of age onward. The survival time and history of symptoms in adults have been reported to be longer than in their counterparts in children. It is believed that growth of brainstem tumors can be guided by structures within the brainstem, leading to an exophytic growth pattern. Glioblastomas develop as de novo tumors or secondarily out of low-grade tumors through progression. In brainstem gliomas, secondary progression from low-grade to high-grade tumors is estimated to occur in as many as 27% in a subgroup of brainstem tumors.

Generally, the differential diagnosis of giant cell glioblastoma of the medulla oblongata...
blastoma includes other high-grade tumors, metastasis, and pleomorphic xanthoastroctyoma, and subependymal giant cell astrocytoma in our case because of the close proximity of the tumor to the fourth ventricle. Pleomorphic xanthoastroctyoma was excluded because the present tumor lacked the characteristic lipid-containing foamy cells and CD34 expression. Furthermore, the tumor clearly showed malignant features such as necrosis and vascular endothelial proliferation, which are not observed in both subependymal giant cell astrocytoma and pleomorphic xanthoastroctyoma. Furthermore, subependymal giant cell astrocytomas often arise in the context of tuberous sclerosis. In our patient no signs of this disease were evident. In general, median survival time with high-grade tumors of the brainstem is comparable to that of their supratentorial counterparts. A 2-year tumor-free survival in a patient with a malignant brainstem tumor appears to be extraordinary. On the other hand, long-term survival has been reported repeatedly in case reports of giant cell glioblastoma located in other supratentorial sites.

The patient presented in this report had an excellent outcome after a combination of excision and radiochemo-therapy of an exophytic giant cell glioblastoma arising from the medulla oblongata. It is important to identify this particular histological entity because it may have a more favorable prognosis, even when it arises from the caudal brainstem.

Disclaimer

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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