Total Resection of a Hemorrhagic Tectal Pilocytic Astrocytoma
—Case Report—

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Abstract
A 21-year-old man presented with a hemorrhagic pilocytic astrocytoma of the tectal plate manifesting as sudden onset of severe headache, vertigo, nausea, and vomiting. Computed tomography demonstrated acute hydrocephalus and hemorrhage within the brain stem and fourth ventricle. Magnetic resonance (MR) imaging revealed a dorsally exophytic tectal tumor as hypointense on the T1-weighted image and hyperintense on the T2-weighted image with contrast enhancement. Radical resection of the tumor was selected because of the unusual aggressive clinical course with hemorrhage and suspicion of malignant components. The tumor was totally resected via an occipital transtentorial approach using a neuronavigation system without surgical complications. The histological diagnosis was pilocytic astrocytoma. The patient was discharged home without neurological deficits on the 9th postoperative day. Twenty-three months after the surgery, follow-up MR imaging demonstrated no recurrence. Tectal plate pilocytic astrocytoma is rarely associated with hemorrhage but should be considered in the differential diagnosis of intracranial hemorrhage with acute presentation. Such exceptional tectal tumors should be resected radically and undergo histological examination to decide on further appropriate treatment.

Key words: intratumoral hemorrhage, pilocytic astrocytoma, surgery, tectum

Introduction
Tumors of the tectal plate are usually well-circumscribed and intrinsic focal lesions of the tectum with indolent clinical course, and the vast majority of patients present with hydrocephalus, commonly caused by aqueductal obstruction secondary to tectal tumors. The overwhelming majority of tectal tumors are low-grade astrocytomas. Accordingly, tectal tumors are often described as a distinctive subset of brain stem glioma with an unusually benign clinical course, and the diagnosis of 'benign tectal glioma' is often based on the neuroimaging appearance and indolent clinical course of the lesion.

Here we describe a case of tectal pilocytic astrocytoma with the extremely unusual initial manifestation of intracranial hemorrhage.

Case Report
A 21-year-old man suffered sudden onset of severe headache, vertigo, nausea, and vomiting. On admission, he was disoriented and had Parinaud's syndrome. Computed tomography revealed acute hydrocephalus and hemorrhage within the brain stem and fourth ventricle (Fig. 1). Continuous ventricle drainage (CVD) was urgently performed. His consciousness soon cleared and Parinaud's syndrome disappeared. Magnetic resonance (MR) imaging 3 days after the CVD demonstrated a tectal lesion on the right side appearing as a low intensity area on T1-weighted images and a high intensity area on T2-weighted images, both associated with a high intensity mass compatible with subacute hemorrhage. The lesion was enhanced after gadolinium administration (Fig. 2A).

Total resection was performed 3 weeks after the onset. The right dorsolateral surface of midbrain was exposed via an occipital transtentorial approach using a neuronavigation system. A dark red-colored portion thought to be the mass with suba-
Fig. 1 Computed tomography scans on admission demonstrating acute hydrocephalus and hemorrhage within the brain stem and fourth ventricle.

Fig. 2 A: Preoperative axial and sagittal magnetic resonance (MR) images demonstrating the exophytic tectal lesion as a low intensity area (arrow) associated with a high intensity area on the left side of the lesion (arrowhead) on the T₁-weighted image (left) suggesting the subacute stage of hemorrhage. The lesion was heterogeneously enhanced after gadolinium administration (center, right). B: Postoperative axial and sagittal MR images with gadolinium revealing that the tumor had been completely resected.

Fig. 3 Photomicrograph of the tumor showing biphasic pattern with compact areas of piloid cells and paucicellular myxoid areas containing sausage-shaped Rosenthal fibers. Hematoxylin and eosin stain, original magnification ×200.

cut hemorrhage was observed through the pia mater, then a pial incision was made upon this area. The lesion was clearly separated from the surrounding brain tissue, and associated with hematoma. After the resection, dorsal aspect of the aqueduct was widely opened. Histological examination of the specimens revealed typical pilocytic astrocytoma including a hemorrhagic portion. Occult coexisting vascular malformations were not observed (Fig. 3).

Postoperatively, the CVD was no longer necessary. MR imaging demonstrated complete resection of the lesion (Fig. 2B). No adjuvant therapy was given. He was discharged home on the 9th postoperative day with no neurological deficits and returned to daily life. Twenty-three months after the surgery, follow-up MR imaging demonstrated no recurrence.

Discussion

The present case of tectal pilocytic astrocytoma manifesting as hemorrhage is extremely unusual. Hemorrhage is an infrequent presentation for pilocytic astrocytoma, although pilocytic astrocytoma was reported as the cause of fatal intracranial hemorrhage in a few cases. Various theories for the etiology of intratumoral hemorrhage have been proposed as follows: Endothelial proliferation with vascular obliteration, vessel compression and/or distortion as a result of rapid growth, vessel necrosis, invasion of a vessel wall by the tumor, and increased venous pressure associated with raised intracranial pressure or thin-walled vessels. However, the cause of hemorrhage in low-grade glioma is not well known. A medullary pilocytic astrocytoma including oligodendroglial parts in a child manifested as acute onset of symptoms caused by an intratumoral hematoma. They suggested that hematomas might originate from abnormal fragile vasculatures in oligodendroglial parts of the tumor or occult coexisting...
vascular malformations. Hemorrhage in pilocytic astrocytomas can be attributed to vascular proliferation, which is an occasional feature of these tumors. In one case of hypothalamic pilocytic astrocytoma with ventricular hemorrhage, the tumor was slow-growing and the patient had developed compensated hydrocephalus, so sudden unexplained decompensation could have resulted in a rapid rise in venous pressure and hemorrhage.

In our case, these mechanisms may have been involved in the hemorrhage.

Review of various cases of tectal gliomas concluded that the good prognostic signs for tectal tumors are pediatric age, small tumor, absence of contrast enhancement, intrinsic localization, and absence of tumor extension. The proposed management plan for the patient subgroup with tectal tumors includes appropriate cerebrospinal fluid diversion procedures with long-term neuroimaging follow up. However, some cases with atypical neuroimaging and/or clinical progression and some exceptionally aggressive cases required further treatment, such as surgical resection or radiotherapy.

In the present case, we decided to perform radical resection of the enhanced tumor because of the unusual aggressive clinical course with hemorrhage and the possibility of malignant components. The surgical cure was successful without neurological deficits.

Tectal plate pilocytic astrocytoma is rarely associated with hemorrhage, but should be considered in the differential diagnosis of intracranial hemorrhage with acute presentation. Such exceptional tectal tumors should be resected radically and undergo histological examination to decide on further appropriate treatment.

References


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