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Case Report

Tectal plate glioblastoma multiforme

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Abstract

Background: Tectal plate tumors have traditionally been considered low-grade, indolent lesions. We report a patient who presented with a tectal region glioblastoma multiforme (GBM), a rare pathology in this anatomic location.

Case Description: This is a case report of a 45-year-old female that presented with worsening confusion, memory loss, and loss of bladder control for 3 days. There was no family history of brain malignancy. The patient presented with Parinaud's phenomenon. Pronator drift was not present. The patient had dysarthric speech. An elevated white blood cell count was also noted. Non-contrast CT scan of the head showed the presence of a tectal region mass and hydrocephalus. A follow-up MRI with and without contrast confirmed the presence of a 4.2 × 3.3 × 4.6 cm^3 mass. Magnetic Resonance Spectroscopy (MRS) demonstrated an elevated choline/*N*-acetylaspartate ratio and an increase in lactate suggesting an aggressive neoplasm. A ventriculoperitoneal shunt was initially placed to relieve the hydrocephalus. The patient subsequently underwent a suboccipital craniotomy for debulking of tumor and for tissue diagnosis. Pathology of the lesion was consistent with GBM. The patient declined postoperative treatment with chemotherapy and radiation.

Conclusion: Although tectal region masses are predominantly low-grade lesions, high-grade lesions can present in this anatomical location. Furthermore, MRS can help to differentiate benign lesions from more aggressive lesions in the tectal plate. Biopsy of tectal plate lesions should be considered in select cases to establish diagnosis and prognosis in order to optimize treatment.

Key Words: Glioblastoma multiforme, hydrocephalus, magnetic resonance spectroscopy, tectal plate

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INTRODUCTION

Glioblastoma multiforme (GBM) is the most common and lethal intracranial adult brain tumor.[4] This malignancy encompasses 12–15% of all intracranial neoplasms and 50–60% of all astrocytic tumors.[10] They occur most frequently in the frontal lobes and are classically seen on CT scan as a mass having a "butterfly" appearance crossing the corpus callosum.[3] Brain stem astrocytic tumors account for less than 2% of all brain tumors in adults and only a very small fraction of those gliomas are in fact GBMs.[5,12] Some of the uncommon

locations of GBMs include third ventricle, tectal plate, cerebellum, and pons.[2,7,9,10] Tectal plate gliomas, in the area comprising the superior and inferior colliculi adjacent to the fourth ventricle and cerebellum, are a group of midbrain tumors typically associated with low-grade features. Several studies suggest that tectal gliomas are mostly low-grade astrocytomas of indolent nature with slow progression and good prognosis.[5,6,8,11,12] The presence of a malignant astrocytoma in the tectal plate is extremely rare with a previously recorded case.[2] Typically metastasis, abscess, low-grade astrocytoma, or ependymoma should be considered in this location in adults, but also medulloblastoma in a pediatric population. One potential modality used to distinguish between abscess and malignancy is the use of Magnetic Resonance Spectroscopy (MRS).[1] In this report, we discuss a case of a patient that presented with hydrocephalus and the pathology of the brain lesion on surgical debulking was GBM involving the tectal plate and fourth ventricle.

CASE REPORT

A 45-year-old female presented with worsening confusion, memory loss, and loss of bladder control for 3 days. She suffered from dizziness for the past year and altered gait for the past few weeks. Her medical history was significant for hypertension, depression, and headaches. Surgical history was limited to two cesarean sections and a tubal ligation. She was a non-smoker with no history of alcohol or drug abuse. There was no family history of brain malignancy. On physical examination, the patient presented with Parinaud's phenomenon, was orientated to person and place, but could not recall the date and relied on her husband to answer most of the questions. The remaining cranial nerves were intact. No pronator drift was present. Strength, sensation, and reflexes in upper and lower extremities were normal. Initial laboratory results were significant for an elevated white blood cell count of 16.7. Non-contrast CT scan of the head showed the presence of a large posterior fossa mass and hydrocephalus. However, it was difficult to discern the boundaries of the mass [Figure 2a and c]. A follow-up MRI with and without contrast confirmed the presence of a 4.2 × 3.3 × 4.6 cm^3 mass in the tectal region compressing the cerebellum and obliterating the fourth ventricle [Figure 1a and b]. The mass caused a 4 mm tonsilar herniation through the foramen magnum. MRS demonstrated an elevated choline/*N*-acetylaspartate ratio and an increase in lactate suggesting an aggressive neoplasm as opposed to an abscess [Figure 3]. A ventricular-peritoneal shunt was initially placed to relieve the hydrocephalus and after discussion with the patient's family surgery was performed to determine the pathology of the mass. The patient subsequently underwent a suboccipital craniotomy with

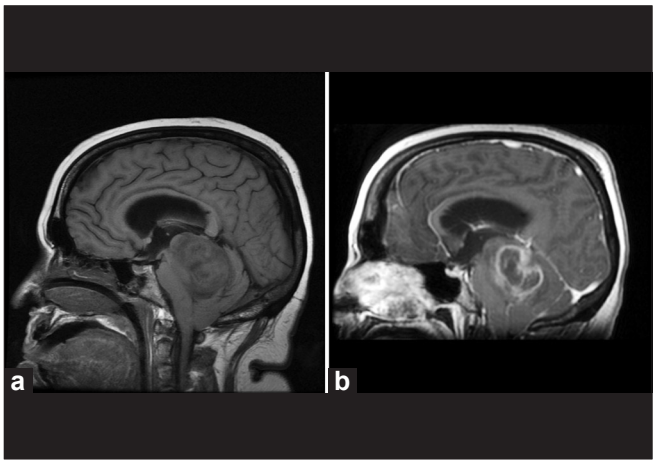

Figure 1: Preoperative noncontrast (a) and contrast (b) T1-weighted sagittal MRI images suggestive of a midline tectal mass with central necrosis

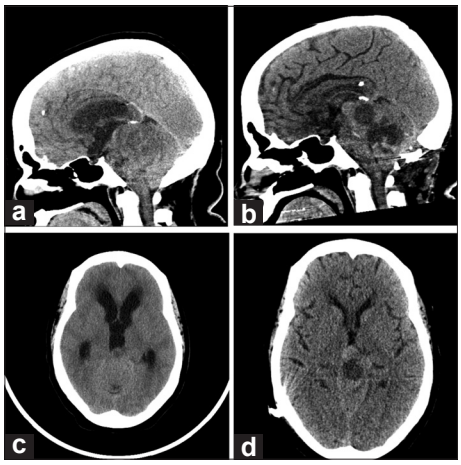

Figure 2: Pre- and postoperative sagittal and axial, noncontrast, CT scans. (a) Preoperative sagittal CT scan illustrating an ill-defined tectal mass. (b) Postoperative sagittal CT scan illustrating partial resection of the lesion, decreased size of the mass, and improvement of hydrocephalus. (c) Preoperative axial CT scan demonstrating marked hydrocephalus and the presence of a midline mass. (d) Postoperative axial CT scan demonstrating improved hydrocephalus and decrease in the mass size after ventriculoperitoneal shunt and debulking of tumor

biopsies of the necrotic mass. Biopsy of the lesion was consistent with GBM [Figure 4a–d]. Her postoperative CT scan showed improvement of hydrocephalus and a decrease in tumor size [Figure 2b and d]. The family declined further treatment after diagnosis of GBM.

DISCUSSION

We described a case of a patient that presented with symptoms related to hydrocephalus caused by a tectal plate mass. A CT scan revealed a posterior fossa mass and MRI localized the mass to the tectal plate as MRI is a better modality for visualization of the posterior

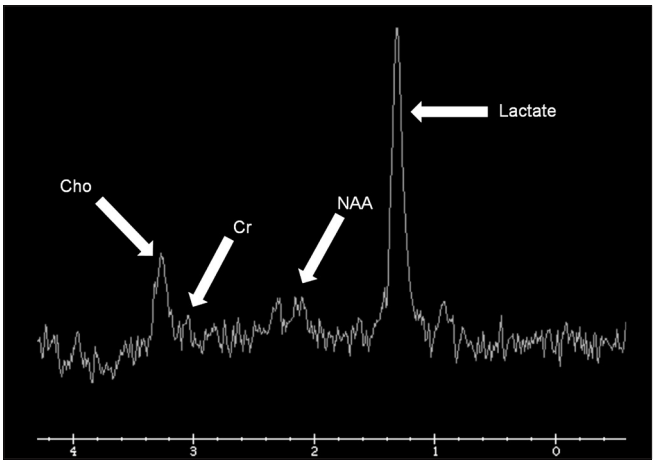

Figure 3: Magnetic Resonance Spectroscopy with voxel in tectal lesion demonstrating elevated choline and lactate with decreased levels of creatine and N-acetylaspartate compatible with a high-grade glioma

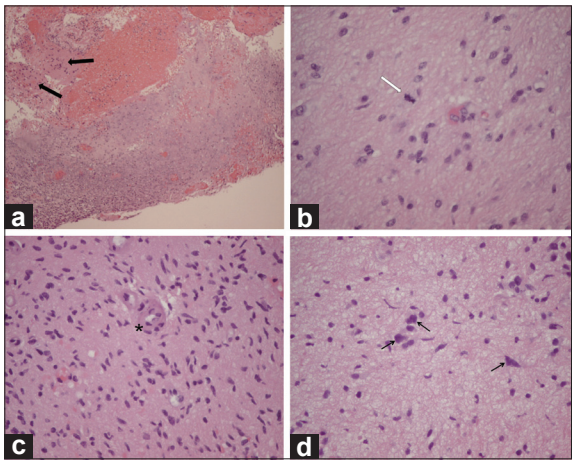

Figure 4: Histological sections (Hematoxylin and eosin stain): Panels a–d show the histological appearance of a high grade glioma, characterized by areas of necrosis (Panel a, dark arrows), increased mitotic activity (Panel b, white arrow), neovascularization (Panel c, asterisk), nuclear pleomorphism and dense cellularity (Panels d, thin black arrows)

fossa.[6] Due to the uncommon location of the mass and the patient's elevated WBC count, the possibility of a brain abscess was initially considered. MRS suggested a highly aggressive neoplasm and the patient underwent a suboccipital craniotomy for resection of the brain tumor. GBM is rarely reported in the posterior fossa. This is the first reported case of tectal plate glioblastoma multiforme that utilized MRS to help delineate the pathology.

Overall, tectal gliomas are commonly low-grade astrocytomas with a good prognosis.[2] The pathology obtained in our patient was consistent with GBM. The brain tumor specimens demonstrated hypercellularity, pleomorphic and hyperchromic nuclei, necrosis, increased mitotic activity, and increased vascularity. Immunohistochemical stains performed at the University of Michigan illustrated the tumor cells overexpressed epidermal growth factor receptor and p53. The MIB-1 proliferation index was elevated with some regions having more than 50% positive cells.

Although tectal plate gliomas are commonly thought to be low-grade neoplasms, MRS correctly suggested aggressive neoplasm in our patient and pathology was confirmed to be GBM postoperatively. This case report suggests that it is important to consider the presence of a high-grade astrocytoma in the differential diagnosis of a tectal plate lesion. Also, MRS may be useful in distinguishing low-grade lesions from high-grade lesions in the tectal region. In select cases, where MRS suggests a high-grade lesion, tissue diagnosis of the lesion should be considered to establish diagnosis in order to optimize treatment.

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