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Case report

Glioblastoma multiforme mimicking optic neuritis

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ABSTRACT

Purpose: To present a case of glioblastoma multiforme which initially presented with only ophthalmic manifestations.

Observations: A 48-year-old man presented with decreased vision and pain with eye movements of the right eye. MRI of the brain showed increased T2/FLAIR signal involving the right optic nerve with no other identified abnormalities. He was treated with intravenous steroids for presumed optic neuritis. His visual acuity then rapidly worsened to no light perception, with new orbital apex symptoms including central retinal artery and vein occlusions and inferior division third and fourth nerve palsies. Repeat MRI with contrast showed perineural enhancement surrounding the right optic nerve and markedly reduced diffusion along its entire course. After an unrevealing initial workup and then a 7 month period during which the patient refused follow up, he re-presented with left sided weakness, headache, and confusion. Repeat brain MRI revealed a large mass involving the right optic nerve, optic chiasm, basal ganglia, corpus callosum and brainstem. Biopsy led to a diagnosis of WHO grade IV glioblastoma multiforme. The disease was poorly responsive to temozolomide, bevacizumab and external beam radiation, and the patient passed away 5 months later.

Conclusions and importance: Malignant optic glioma of adulthood is a challenging diagnosis with a poor prognosis. This rare case highlights the importance of maintaining neoplasm in the differential for optic neuritis masqueraders.

1. Introduction

Malignant optic glioma in adulthood is a rare and difficult diagnosis, first described by Hoyt in 1973.[1] Since then, there are only about 70 reported cases in the literature.[2] Unlike benign optic nerve gliomas, which are low grade astrocytomas, malignant visual pathway gliomas typically present as anaplastic astrocytoma (WHO Grade III) or glioblastoma (WHO grade IV), and there is no association with neurofibromatosis. Initial presentation can mimic optic neuritis, ischemic optic neuropathy, and retinal vessel occlusion.[2] We report a case that was initially diagnosed as optic neuritis and then evolved to an orbital apex syndrome with combined central retinal artery and vein occlusions and ophthalmoplegia.

1.1. Case report

A 48-year-old man with poorly controlled type 2 diabetes presented to a general ophthalmologist with progressive visual loss and pain with movements of the right eye for three days. Review of systems was otherwise negative. On examination his visual acuity in the right eye measured 20/60 with diminished color vision. A right afferent pupillary defect was present and dilated examination revealed severe right optic disc edema without hemorrhage. The examination was otherwise unremarkable. Visual acuity in the left eye was 20/20 with normal anatomical exam. MRI of the brain without contrast demonstrated increased T2/FLAIR signal of the right optic nerve, which was interpreted as consistent with optic neuritis. No other abnormalities were noted on the MRI. The patient was admitted for 3 days of intravenous solumedrol. Three days after discharge, the patient's visual acuity had deteriorated to no light perception in the right eye, with an amaurotic pupil and dilated fundus examination findings consistent with combined central retinal artery and vein occlusions (Fig. 1). There were no signs of uveitis or retinitis. Sensorimotor examination also demonstrated limited infraduction and adduction, and limited intorsion on attempted depression, compatible with palsies of the inferior division of the third cranial nerve and fourth cranial nerve, respectively. The left eye remained stable. Repeat diffusion-weighted MRI of the brain and orbits demonstrated progressive enlargement of the right optic disc and nerve

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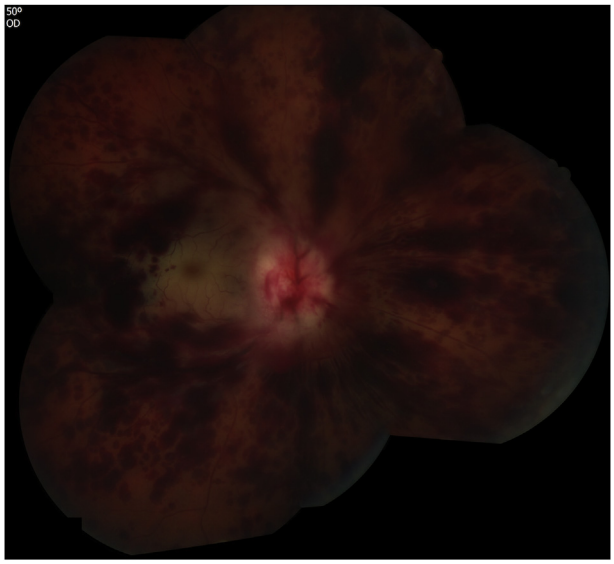

Fig. 1. Color fundus photograph of the right eye at time of complete visual loss demonstrating combined central retinal artery and vein occlusions.

with severe perineural enhancement extending to the orbital apex and marked diffusion restriction (Fig. 2). There were no other abnormalities.

Given the acute worsening with steroid treatment, infection was initially suspected. Serologies were negative for syphilis, Lyme disease, Bartonella, Toxoplasma, Histoplasma, and Cryptococcus. CBC, ACE, ESR, and lysozyme levels were also normal. The patient refused any further work up, including lumbar puncture and optic nerve biopsy. He agreed only to empiric treatment with intravenous acyclovir, oral sulfamethoxazole-trimethoprim and doxycycline. His pain improved but his exam remained unchanged after 3 days. He then left the hospital against medical advice and refused follow up until 7 months later, when he presented to his primary care physician for 1 week of headache, left arm and leg weakness, and mild confusion.

MRI of the brain at that time (Fig. 3) revealed multiple intracranial expansile masses with varying degrees of enhancement involving the splenium of the corpus callosum and both thalami and internal capsules, with extension to the right optic chiasm and nerve and also down into the pons and medulla. A total retinal detachment of the right eye was also noted. MRI of the spine showed no evidence of disease. The findings were felt to suggest a high-grade neoplasm and biopsy of the splenium resulted in a diagnosis of WHO grade IV glioblastoma multiforme, further characterized histopathologically as IDH1 (R132H) wild-type, H3 K27M mutation negative, MGMT promoter methylation negative disease. The patient was treated with external beam radiation therapy with concurrent temozolomide and bevacizumab chemotherapy but the cancer was poorly responsive, his neurologic status progressively declined, and he passed away 5 months later.

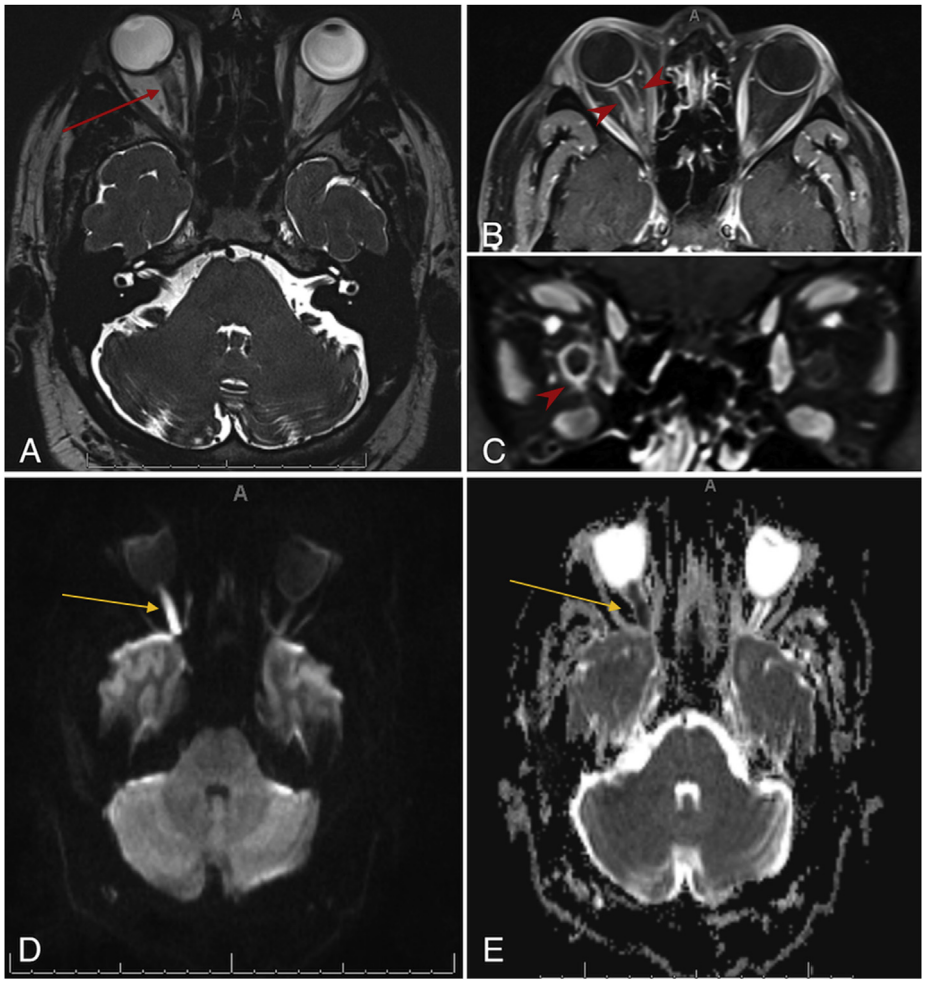

Fig. 2. MRI of the brain and orbits at the time of complete vision loss in the right eye. showing thickening and perineural enhancement of the right optic nerve extending to the orbital apex on T2 (A, red arrow) and T1 post-contrast (B-C, red arrowheads) images and marked diffusion restriction along the nerve on DWI (D, yellow arrow) and ADC (E, yellow arrow) images.

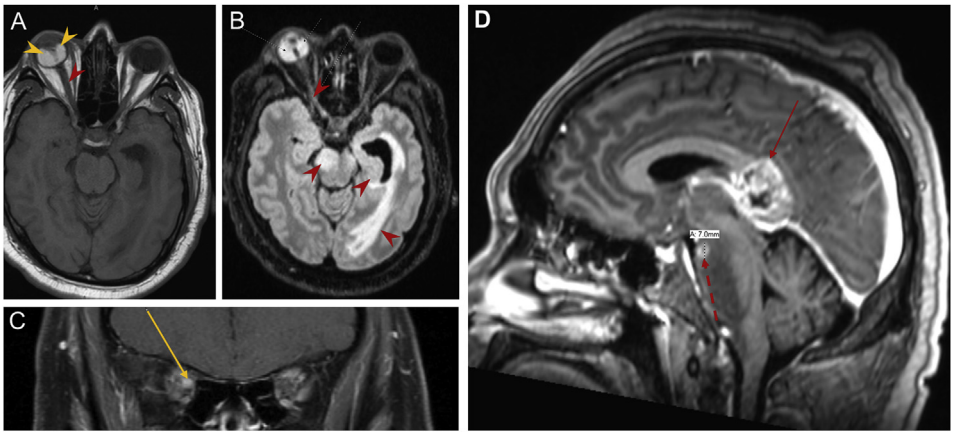

Fig. 3. MRI of the brain and orbits 7 months after initial presentation, when the patient re-presented with new left hemiparesis, headache, and confusion. (A) T1-weighted image showing isointense right optic nerve (red arrowhead) with total retinal detachment (yellow arrowheads). (B) T2/FLAIR image demonstrating increased signal in the right optic nerve and chiasm, left internal capsule, left optic radiation, and right midbrain (red arrowheads). (C) T1 post-contrast image showing perineural contrast enhancement of the right optic nerve (yellow arrow). (D) T1 post-contrast MPR image demonstrating a large heterogeneously enhancing mass in the corpus callosum (red solid arrow) with additional focus in right anterior midbrain (red dashed arrow).

2. Discussion

We present a case of malignant optic glioma that mimicked an optic neuritis then progressed to an orbital apex syndrome with combined central retinal artery and vein occlusions and ophthalmoplegia. Initial evaluation aiming at exploring infectious and inflammatory possibilities was unrevealing and the patient refused further work up and was lost to follow up. It was only after he re-presented 7 months later that the diagnosis of glioblastoma multiforme declared itself with extensive brain involvement. Although not obvious on the initial MRI, presumably the increased signal along the optic nerve represented a focus of cells that underwent malignant transformation and may have spread along the visual pathway. In a review of 45 cases by Wabbels et al. the optic nerve and chiasm may be the initial site of involvement and the tumor can spread beyond the visual pathway to involve the hypothalamus (50% of patients), temporal lobe (22.5%), and basal ganglia (15%), as in our patient.[3] In general, MRI features are nonspecific but tend to demonstrate iso- or hypo-intensity on T1-weighted imaging, hyperintensity on T2-weighted imaging, and variable degrees of contrast enhancement.[2] Biopsy is indicated for diagnosis.

The patient's visual loss can be attributed to optic nerve infarction from tumor infiltration and from secondary total retinal ischemia from combined retinal artery and vein occlusions. The ophthalmoplegia was suspected to be secondary to infiltration at the orbital apex with either compression and/or infiltration of the fourth and inferior division of the third cranial nerves; early mesencephalic infiltration was also considered in retrospect but felt less likely given the partial nature and relative neurologic isolation at the time of presentation. The extensive perineural enhancement of the nerve made radiographic evaluation of nearby structures more challenging but there was felt to be some questionable enhancement of the third nerve in the superior orbital fissure. Pathology was not obtained so it is unclear whether the retinal detachment noted on subsequent imaging was a consequence of retinal ischemia or intraocular tumor involvement. Intraocular tumor extension has previously been described, though not confirmed by biopsy, in three cases.[2,4,5] Treatment for malignant optic glioma predominantly includes radiation and chemotherapy. In our patient, the radiation field included the globe in case of intraocular involvement. Unfortunately, even with treatment, overall survival is poor and the disease is usually lethal within 1–2 years of diagnosis, as was the case for our patient.[6]

3. Conclusion

Malignant optic glioma of adulthood is a rare and challenging diagnosis with a poor prognosis.

Patient consent

Consent to publish the case report was not obtained. This report does not contain any personal information that could lead to the identification of the patient.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Declaration of competing interest

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