Glioblastoma Multiforme: Correlating Visual Symptoms to Brain Tumor Location

Abstract: Glioblastoma multiforme is an aggressive form of malignant brain tumor that can present with variable symptoms depending on anatomical location of the mass. The following case describes the visual symptoms associated with an temporo-occipital lesion.

I. Case History

• Patient demographics: 68 year old white male
• Chief complaint: A patient with a newly-diagnosed brain mass presented to the eye clinic describing an episode of environmental agnosia while driving a familiar route. This incident was followed by a subsequent episode of prosopagnosia lasting several hours. Both of these symptoms had occurred a handful of times over the past year and a half. He also mentioned a dull pain on the back of his head, noticed over the past several months.
• Ocular history: LEE: 04/28/10 – dilated fundus examination revealed no ocular pathology.
• Medical history: COPD, bladder cancer, hypertension, malignant neoplasm of brain
• Medications: Dexamethason 4mg, temozolomide 140mg, morphine sulfate 15mg, albuterol 90mcg, Budesonide 160/Formoter 4.5 mcg, Amlodipine Besylate 5mg, Metoprolol Succinate 100mg

II. Pertinent Findings:

• Clinical Examination:
  VA cc: OD 20/20, OS 20/25 PH NI
  Finger counting fields: OD: restricted superior-temporal, OS: restricted superior nasal
  EOM: SAFE OU, Pupils: EERRL OD/OS with no APD
  Anterior Segment: Conjuntiva: White and quiet OU, Cornea: Clear OU, Anterior Chamber: Deep and quiet OU, Iris: flat and brown OU, Lens: 1+ NS OU
  Intraocular pressure: OD: 21mmHg, OS: 21mmHg
  Fundus: Nerves: OD: .30, OS: .30, pink and healthy, (-) papilledema
    Vessels: within normal limits OU, Macula: flat and clear OU
    Periphery: no holes/tears/detachments OU, Vitreous: clear OU
• Radiology studies: CT of the head revealed a 3cm X 2.5cm mass in the posterior right temporal lobe and medial occipital lobe. An MRI of the brain revealed a 3.4cm x 2.6cm x 2.4cm mass.
• Visual field testing:
  Pre-treatment HVF 24-2 was unreliable but suggestive of a superior left quadranopsia.
  Post-treatment HVF 30-2:
    OD: reliable. MD: -5.02. Superior left quadranopsia sparing central vision
    OS: reliable. MD: -4.67. Superior left quadranopsia sparing central vision

III. Differential diagnosis:

• Primary/leading: Space-occupying lesion of the temporo-occipital region
  -Differentials for intracranial masses include an astrocytoma, chordoma, CNS lymphoma, glioma, medulloblastoma and several others. Biopsy is needed to determine a definite diagnosis.
• Others: Posterior cerebral artery infarcts and hemorrhages in the infero-medial part of the temporo-occipital area.
  -Key findings for all differentials: superior quadranopsia visual field defect, visual and auditory hallucinations, memory loss, visual agnosia, headache

IV. Diagnosis and discussion: Following identification and localization of the intracranial mass, a biopsy was completed. The diagnosis is glioblastoma multiforme in an inoperable location.
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Glioma is the term used to describe a tumor arising from glial cells. Gliomas are graded by degree of malignancy, with grade four gliomas, or glioblastoma multiforme, being the most aggressive and most common form of intracranial tumor found in humans. These neoplasms exhibit advanced signs of malignancy, including uncontrolled cellular proliferation, resistance to apoptosis, and widespread infiltration of surrounding tissues. For these reasons, glioblastoma multiforme are often recalcitrant to treatment and highly lethal, often resulting in mortality within 12 months of diagnosis.

Most commonly, glioblastoma multiforme originate in the frontal and temporal lobes, with three percent of lesions arising occipitally. Symptomatology varies based on tumor location. Lesions affecting the occipital lobe can present with a wide array of visual symptoms, including peripheral vision loss, visual hallucinations, and several forms of visual agnosia. Masses that affect the temporal lobe often manifest with memory impairment, auditory hallucinations, spatial disorientation, and peripheral vision loss.

The patient’s visual symptoms were highly localizing to the site of his glioma. One symptom reported was prosopagnosia. Prosopagnosia is the result of damage to the fusiform gyrus, an area of the brain shared by the inferior portion of the temporal lobe and superior aspect of the occipital lobe. Another symptom the patient reported was environmental agnosia. This is experienced when there is a lesion effecting the parahippocampal place area, an area located in the inferior tempor-occipital cortex that plays an important role in recognition of environmental scenes. The mass, as identified by imaging studies, makes contact with both of these regions of the brain.

Though the patient was not symptomatic for peripheral vision loss, formal visual field testing revealed an incomplete incongruous superior left quadranopsia. A superior quadranopsia or “pie in the sky” visual field defect localizes to the temporal lobe opposite to the laterality of the brain lesion. The patient’s visual field defect localizes to the right temporal lobe.

V. Treatment, management: The patient was started on chemoradiotherapy, including eleven sessions of radiation with concomitant use of a chemotherapeutic medication, Temozolomide. The goal of treatment is palliation and has been well tolerated by the patient. Post-treatment MRI did not show significant enlargement or reduction in tumor size. A follow-up MRI is scheduled for August 21st.

VI. Conclusion: As primary eyecare providers, it is important for optometrists to pay close attention to unusual visual symptoms experienced by our patients, as these symptoms can be useful in the diagnosis, localization and comanagement of patients with intracranial masses.

VII: Bibliography: