CASE REPORT

Management of Optic Neuropathy from an Apical Orbital-Cavernous Sinus Hemangioma with Radiotherapy

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ABSTRACT We document a case of reversal of compressive optic neuropathy caused by a cavernous sinus-orbital cavernous hemangioma following treatment by conformal stereotactic radiotherapy.

KEYWORDS Cavernous hemangioma; cavernous sinus tumor; optic neuropathy; stereotactic conformal radiotherapy

INTRODUCTION
Extra-axial cavernous hemangiomas are rare vascular tumors, accounting for 0.4–2.0% of intracranial cavernous hemangiomas (Zhou et al., 2003). They are well-encapsulated lesions arising within the cavernous sinus (Linskey & Sekhar, 1992; Goel et al., 2003). Clinically, unilateral blurred vision, diplopia, facial numbness, headache, or impairment of extraocular movement are common signs and symptoms (Zhou et al., 2003). Current treatment modalities for symptomatic hemangiomas include resection, fractionated radiation therapy, or a combination of both (Kida et al., 2001). Unfortunately, piecemeal resection of these tumors is difficult, with excessive bleeding and a high risk of injury to the cranial nerves in the cavernous sinus as well as the carotid artery.

CASE REPORT
A 30-year-old woman noted some haziness of vision and increasing right retrobulbar pressure for 6 months. She had infrequent vague headaches associated with nausea. Her medical history was unremarkable. On examination, visual acuity was 20/25 OD and 20/20 OS uncorrected. Pupils were 3 mm and reactive to light, with a mild (0.9 neutral density filter) right relative afferent pupillary defect. Color vision with Ishihara plates revealed 6 errors OD compared to 1 error OS. Fundoscopic examination revealed +1 right temporal disc pallor. Goldmann visual field testing revealed significant multiple paracentral scotomas and constricted visual field (Fig. 1).

On imaging, computed tomography (CT) and magnetic resonance imaging (MRI) of the orbits demonstrated a 1.9 × 1.0-cm enhancing lesion in the posterior aspect of the right orbit, extending into the superior orbital fissure and...
FIGURE 1  (A and B) Goldmann visual field perimetry results done prior to treatment and (C and D) on the day of completion of stereotactic radiotherapy.

FIGURE 2  (A) Pre-treatment MRI scan of a 30-year-old woman showing an apical orbital-cavernous sinus cavernous hemangioma. MRI scans done at (B) 6 months, (C) 1 year, and (D) 2 years after fractionated conformal stereotactic radiotherapy demonstrate continuous shrinkage.
the anterior portion of the right cavernous sinus. Radiologically, the lesion was consistent with a cavernous hemangioma (Fig. 2).

The patient was assessed for consideration of a combined cranio-orbital resection of the mass. In view of the location and surgical risk factors, however, we elected to do conformal stereotactic radiotherapy, which was delivered at a dose of 50.4 Gy in 28 fractions. Examination on the day of completion of radiotherapy revealed a visual acuity of 20/20 OU. There were no errors on Ishihara color testing, but the patient had a persistent right afferent pupillary defect and unchanged temporal pallor. Follow-up Goldmann visual fields showed dramatic improvement of the field defect in the right eye (Fig. 1). At 6 months, 1-year, and 2-years follow-up post-therapy, the patient was asymptomatic. She was visually stable, and repeat MRI demonstrated continued tumor shrinkage (Fig. 2).

**DISCUSSION**

Cavernous hemangiomas account for 2% of all cavernous sinus tumors (Linskey & Sekhar, 1992). They are insidious, occur predominantly in women (94%) (Linskey & Sekhar, 1992) and usually present in the fourth decade of life (Linskey & Sekhar, 1992; Goel et al., 2003). No specific clinical characteristics differentiate them from other cavernous sinus neoplasms (Linskey & Sekhar, 1992). Patients usually present with headaches and dysfunction of the cranial nerve passing through the cavernous sinus, particularly ptosis and diplopia. Visual acuity is decreased when the optic nerve is compressed, and pituitary hypofunction has been reported (Linskey & Sekhar, 1992). Our patient presented with optic neuropathy and infrequent headache associated with nausea, without other neurologic or endocrinologic problems.

On CT imaging, cavernous hemangiomas characteristically extend to the sella and superior cavernous sinus (Linskey & Sekhar, 1992), are isodense or minimally hyperdense, with intense homogeneous contrast enhancement (Sohn et al., 2003). MRI imaging reveals well-defined masses that are hypointense on T1-weighted images and markedly hyperintense on T2. On contrast-enhanced T1 imaging, they are homogeneously and densely enhanced (Goel et al., 2003; Sohn et al., 2003). Cavernous sinus tumors pose a considerable challenge for surgeons; because of their location and relationship to the neurovascular structures, they are prone to profuse bleeding, high morbidity, and mortality when resection is attempted (Linskey & Sekhar, 1992). Smaller lesions and mild symptoms can be clinically and radiologically observed due to the benign nature of the lesion (Goel et al., 2003). Several authors have suggested that radiosurgery could play a role in the treatment of small cavernous hemangiomas in the cavernous sinus that are not adherent to the optic nerve or for small residual lesions (Goel et al., 2003; Kida et al., 2001). Fractionated stereotactic radiotherapy should not be confused with stereotactic radiosurgery, which delivers a higher single radiation dose in one session and can be associated with a higher risk of damage to the retina, optic nerve, or chiasm (Kondziolka et al., 1999). Herein, we report excellent visual results and shrinkage, with no further growth after a 2-year follow-up from fractionated conformal stereotactic radiotherapy (50.4 Gy in 28 fractions) as primary treatment, without complications.

**REFERENCES**


