without prior treatment with chemotherapy or radiation therapy. There was a marked regression in tumour height, from 3.5 mm to unmeasurable 14 months after PDT. The patient's vision was reduced from 20/80 to 20/125.[6] It is possible that, in our patient, PDT was not as effective in reducing tumour height because of tumour thickness.

In conclusion, PDT is a good treatment option for choroidal metastatic carcinoid tumours. It leads to reduction of tumour size, resolution of subretinal fluid caused by the tumour, and marked improvement in vision. In addition, it seems to work as a primary treatment modality or after failed radiation alone or failed radiation and systemic chemotherapy. Furthermore, it works on choroidal metastatic carcinoid tumours whether the tumour demonstrates intratumoural vascularity or not on IVFA. However, thicker tumours have a favourable response that may be limited by thickness. Further clinical trials with a larger sample size might be helpful to validate the efficacy of PDT in treatment of choroidal metastatic carcinoid tumours.

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Choroidal metastasis arising from esophageal adenocarcinoma

The majority of choroidal metastasis in the eye arises from primary tumours of the breast, lung, prostate, and gastrointestinal tract primary sites but rarely from the esophagus.[1–4] Recently, a few cases have been reported that may coincide with the increasing incidence of Barrett's esophagus and associated esophageal adenocarcinoma.[1,2,5] We present a case of esophageal adenocarcinoma that initially presented with signs and symptoms of choroidal metastasis.

Case Description

A 72-year-old Caucasian male presented with left eye peripheral vision loss, accompanied by occasional photopsias and mild intermittent eye pain. The patient had a remote history of enucleation of his right eye secondary to a traumatic injury. The patient's review of systems was negative except for longstanding gastroesophageal reflux that was controlled by ranitidine.

Ophthalmologic examination of the left eye revealed a superonasal choroidal mass with associated serous retinal detachment (Fig. 1). B-scan ultrasonography of the left eye demonstrated a choroidal lesion measuring 4.82 mm by 14.37 mm (Fig. 2). A-scan demonstrated moderate internal reflectivity. Systemic work-up and imaging were initiated, and the patient was referred to oncology.

Magnetic resonance imaging of the brain revealed multiple brain lesions, and contrast-enhanced computed tomography of the chest revealed a distal esophageal mass that extended to the gastroesophageal junction. Subsequent esophagogastroduodenoscopy showed a 75% obstructing mass. Biopsies displayed moderately differentiated adenocarcinoma and amplification of the *ERBB2* (HER2/neu) gene.

Ultimately, the patient was not deemed to be a good surgical candidate, and palliative whole-brain, orbit, and

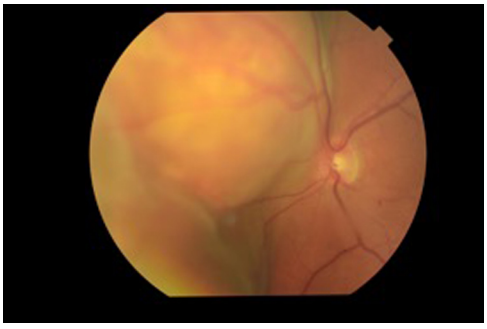

Fig. 1—Colour fundus photograph of the left eye revealing a choroidal mass with associated serous retinal detachment.

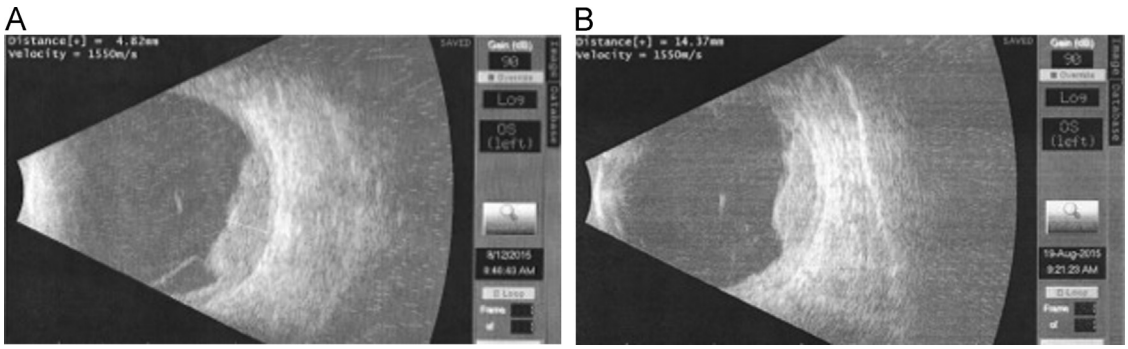

Fig. 2—B-scan of the left eye showing that the lesion measured 4.82 and 14.37 mm on transverse 9 o'clock (A) and longitudinal 11 o'clock (B) scans.

eventual spine external beam radiation therapy were pursued. Subsequently, the patient underwent treatment with capecitabine and trastuzumab.

Discussion

The majority of metastases arise from breast or lung primaries, but choroidal metastases arising from gastrointestinal tract tumours are less common.[1–4] Nevertheless, choroidal metastases from the *lower* gastrointestinal tract predominate among the reported cases, whereas metastases from esophageal sources prove to be quite rare according to the literature.[1,2,4] Both metastases to the choroid from squamous cell carcinoma and adenocarcinoma of the esophagus have been reported in the literature, with the first published account occurring in 1970.[6,7] In 2003, there were only 3 published accounts of choroidal metastasis arising from adenocarcinoma. According to an American Society of Clinical Oncology 2010 article, "esophageal carcinomas metastasizing to the uveal tract are extremely rare."

Because of its highly vascular nature, it is possible that virtually any cancer can spread hematogenously to the choroid. Metastatic tumours spreading to the choroid manifest clinically with progressive visual disturbances, photopsias, and floaters or are completely asymptomatic and diagnosed incidentally as yellow and possibly multilobulated structures on fundoscopic examination.[4,8] The appearance of esophageal adenocarcinoma metastasis to the choroid is typically no different from that of the lung and breast on fundoscopy and will give similar reflectivity on A-scan ultrasonography. As seen in our patient, echographically, metastatic choroidal lesions have irregular boarders, medium-high irregular internal reflectivity, and relatively little internal vascularity.[8] Compared with uveal melanomas, choroidal metastasis lesions typically exhibit a higher incidence of associated retinal detachments.[8]

Esophageal adenocarcinoma arises from columnar metaplasia of the distal third of the esophagus (Barrett's esophagus), often in patients diagnosed with chronic GERD and obesity.[5] The malignancy has a strong male predominance (7–10×) and has a mortality rate of 85%. In recent years, there has been an increase in the number of cases of adenocarcinoma of the esophagus, associated with the increasing prevalence of GERD and Barrett's esophagus.[5] As such, physicians involved in treating these common conditions should consider this potential, although rare, ocular manifestation as the presenting symptoms of metastatic disease.

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Progressive optic nerve glioma: orbital biopsy technique using a surgical navigation system

An 11-year-old male child presented with worsening vision in his left eye. Examination and imaging revealed a left optic nerve tumour causing mass effect and optic neuropathy, without systemic evidence of neurofibromatosis. In view of the significant risk to visual acuity, a biopsy was deferred and chemotherapy was commenced. After initial stability, continued visual decline necessitated incisional biopsy. Surgical navigation was used to facilitate minimal access surgery avoiding bone removal. The system also precluded biopsy of cystic parts of the tumour, allowing successful intraoperative frozen-section confirmation of lesional tissue. Our case report serves to highlight specific circumstances where surgical navigation may be a useful tool for the orbital surgeon.

Case Report

An 11-year-old male child presented with a 3-month history of blurred vision in his left eye. He had no other visual or systemic symptoms. His medical history was unremarkable. He had an ocular history of bilateral optic disc drusen (Fig. 1A) that had remained stable with no effect on visual acuity or optic nerve function on previous reviews. On this examination, his vision was 20/20 right eye and 20/50 left eye. He had loss of color vision and an inferior visual field defect in the left eye on automated testing. He also had a left relative afferent pupillary defect with 2 mm of proptosis by Hertel exophthalmometery. Fundus examination showed severe edema of the left optic nerve (Fig. 1B). An urgent magnetic resonance imaging (MRI) was performed on the day of presentation and revealed a heterogeneously enhancing mass involving the intraorbital left optic nerve with minimal extension to the intracanalicular and prechiasmatic segments (Fig. 2A). Based on typical imaging features, a presumptive diagnosis of optic nerve glioma was made. Orbital biopsy was discussed between the patient, parents, and multidisciplinary team, but deferred because of the significant risk of iatrogenic worsening of vision in the affected eye.

The patient was started on vinblastine and followed closely. For 5 months, the patient's visual acuity and field

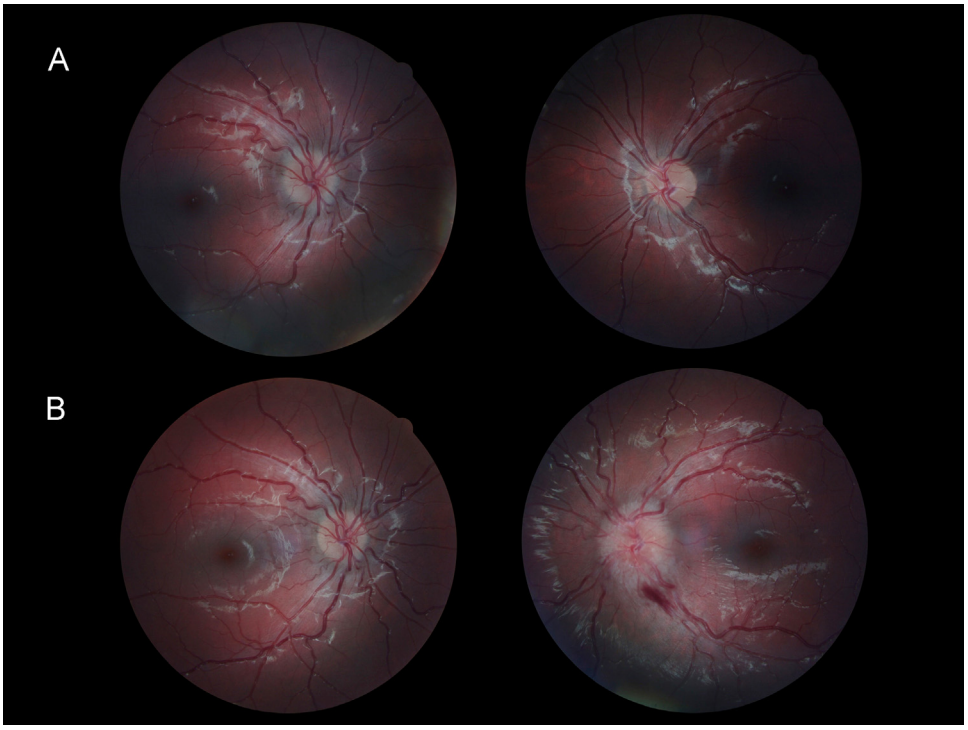

Fig. 1—(A) Fundal view at past follow-up with bilateral optic disc drusen. (B) Fundal view at initial presentation with decreased vision OS. Note significant disc edema, vessel blurring, and inferior flame-shaped hemorrhage.