Unilateral Multifocal Choroidal Melanoma

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Established Facts

- Uveal melanoma has an incidence of 5.1 cases per million per year.
- Multiple choroidal melanomas arising in the same eye are extremely rare, with less than 20 such cases reported.

Novel Insights

- We report a patient with 2 distinct choroidal melanomas separated in diagnosis by 20 years.
- The second tumor occurred after proton beam globe therapy had successfully treated the primary lesion.
- Imaging techniques such as optical coherence tomography angiography can achieve resolution that rivals dye-based angiographic techniques in evaluating choroidal melanomas.

Keywords

Choroidal melanoma · Multifocal melanoma · Melanoma · Tumor recurrence · Proton beam radiotherapy · Optical coherence tomography angiography

Abstract

We report a case of multifocal choroidal melanoma in the same eye, separated in presentation by 20 years. A 57-year-old Caucasian male initially presented with a choroidal melanoma of the right eye that was treated with transpupillary thermotherapy. Due to recurrence, the patient underwent

proton beam therapy with subsequent tumor regression. A second small choroidal lesion was noted in the right eye during his surveillance examinations that was closely monitored and demonstrated stable dimensions and features suggestive of a choroidal nevus. Twenty years after his first presentation, the second lesion exhibited accelerated growth with imaging studies indicative of transformation to a distinct choroidal melanoma. The patient underwent a second globe salvage treatment of proton beam therapy. We describe the clinical course, radiographic, and imaging findings of this rare choroidal melanoma.

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Introduction

Whereas uveal melanoma has an incidence of 5.1 cases per million per year in the United States [1], bilateral choroidal melanomas are a rare event [2], estimated to occur in only 1 in 50 million Caucasians [3]. Even rarer are multiple choroidal melanomas arising in the same eye, with less than 20 such cases reported to date [4]. We report a patient with 2 distinct choroidal melanomas in the same eye, with the second tumor diagnosed 20 years after the first. Initially, the second lesion resembled a choroidal nevus with high-risk features, transforming into a definite melanoma prompting globe salvage treatment with a second treatment of proton beam radiotherapy.

Case Report

A 57-year-old Caucasian male was referred to the oncology service for continued follow-up for a treated choroidal melanoma of the right eye. The patient was first diagnosed in 1996 and underwent transpupillary thermotherapy. Due to recurrence, he underwent proton beam therapy in 2008 with good lesion regression. The patient's best-corrected vision in the affected eye was 20/30. He was otherwise healthy with negative screening for metastatic disease.

Slit-lamp examination was unremarkable with no evidence of Nevus of Ota. Fundus photos of the patient following proton beam therapy in 2008 (which was not available for review initially) showed a treated lesion with a flat nevus superonasal to the optic disc. Fundus examination at initial presentation in 2015 demonstrated a sclerotic, treated choroidal melanoma superotemporal to the optic disc (Fig. 1a). A second choroidal tumor was noted superonasal to the optic disc (Fig. 1b), measuring 3.6 mm in basal dimension and 1.1 mm in thickness on ultrasonography (Fig. 2a). This lesion had been documented for many years before with sim-

ilar dimensions in the patient's records. Nonetheless, the patient was scheduled for close follow-up, and the lesion was stable on repeat fundus examination (Fig. 1c) and ultrasonography (Fig. 2b) 1 month later. At the 6-month follow-up, there was small interval growth on ultrasonography. At the 12-month follow-up, there was continued growth (Fig. 1d) with the choroidal lesion measuring 5.2 mm in basal dimension and 2.0 mm in thickness on ultrasonography (Fig. 2c). The left eye was normal with no lesions noted during this time span (Fig. 1e).

Fluorescein angiography revealed hypofluorescence of the treated choroidal melanoma with staining in the macula (Fig. 2d). The second choroidal lesion revealed simultaneous retinal and tumor circulation along with late leakage surrounding the lesion (Fig. 2d). Optical coherence tomography angiography (OCTA) showed disruption of the superficial and deep retinal vascular layers confined to the new choroidal lesion (Fig. 2e, f). Given the clinical features and growth of this lesion, a second discrete choroidal melanoma was diagnosed. Orbital magnetic resonance imaging to rule out extraocular spread was normal. Systemic BAP1 testing was negative [5]. Enucleation or globe salvage therapy was offered. The patient elected to undergo a second proton beam radiotherapy of the right eye without biopsy for genetic testing to assess for metastatic risk [6]. The patient has been stable after the treatment.

Discussion

Multiple choroidal melanomas are exceedingly rare. Similar to previous multifocal uveal melanomas, the transformation from nevus to melanoma can be sudden without increased associated risk factors [7]. This case was especially unique in that the second choroidal tumor that underwent malignant transformation was preceded 20 years prior by the first melanoma. The pathophysiology of this malignant process is unclear, although recurrent melanoma has been reported in a patient who was

Fig. 1. Serial fundus photographs documenting the transformation of the second choroidal lesion from nevus to melanoma. **a** Fundus photograph of the right eye showing the original choroidal melanoma previously treated by transpupillary thermotherapy in 1996 and proton beam radiotherapy in 2008. The second choroidal lesion superonasal to the optic disc is flat and without any high-risk

features. **b** Small raised choroidal lesion superonasal to the optic disc noted on presentation in 2016. **c** Lesion superonasal to the optic disc 1 month later without discernable change in appearance or size. **d** Interval increases in size and coloration of the choroidal lesion after 12 months. **e** Fundus photograph of the left eye with no abnormal features.

Fig. 2. Ultrasonography, fluorescein angiography (FA), and optical coherence tomography angiography (OCTA) in documenting features of progression to choroidal melanoma. **a** Ultrasonography at presentation in 2016 showing the superonasal choroidal lesion measuring 3.6 mm in basal dimension and 1.1 mm in thickness. **b** Ultrasonography at 1 month with similar dimensions. **c** Ultrasonography at 12 months showing interval increase in dimensions to 5.2 in basal dimension and 2.0 mm in thickness. **d** FA

of the right eye at 12 months revealing hypofluorescence of the treated lesion with small punctate areas of leakage into the macula along with double circulation and late dye leakage emanating from the second choroidal lesion. **e** OCTA of the treated lesion at 12 months illustrating sclerosis of the underlying retinal vasculature. **f** OCTA of the new untreated choroidal tumor at 12 months illustrating disruption of both the superficial and deep retinal vascular layers.

initially treated with proton beam radiotherapy for the primary lesion [8].

Clinical evaluation and imaging studies demonstrated normal intervening choroidal tissue suggesting these are 2 discrete lesions. The recent advent of swept-source

OCTA has allowed clinicians to noninvasively capture high-resolution *in vivo* images of retinal and choroidal structures and achieve resolution that rivals dye-based angiographic techniques [9]. Serial pathologic sectioning was not done given the globe was salvaged; thus, this case

demonstrates that OCTA is a critical, noninvasive imaging modality to delineate distinct choroidal tumor margins. OCTA revealed the relative vascular disruption in the area of the second tumor compared to the treated primary tumor with intervening areas of normal retinal vascularity.

In summary, this case highlights the importance of screening patients with choroidal melanoma, particularly those with other choroidal nevi. Although rare, second noncontiguous tumors have been reported to occur.

Statement of Ethics

The patient agreed to the publication of the clinical photographs.

Disclosure Statement

The authors declare no conflicts of interest.

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