

PDT AS PRIMARY THERAPY FOR CHOROIDAL METASTASES FROM CARCINOID TUMOR



These malignancies may be well-suited to treatment with this modality.

BY ROSHUN SANGANI, BS; MEHDI MAZLOUMI, MD, MPH; LAUREN A. DALVIN, MD; AND CAROL L. SHIELDS, MD

Choroidal metastases from carcinoid tumors are rare, constituting only 2% of all uveal metastasis.¹ These tumors classically appear as an orange-colored mass with associated subretinal fluid (SRF) that can lead to decreased vision.²⁻⁴ In an analysis of 1,111 patients with uveal metastasis, it was apparent that the best long-term survival was achieved in those originating from carcinoid tumor.¹

Regarding management, few case reports have evaluated the role of external beam radiotherapy, plaque radiotherapy, proton beam radiotherapy, or photocoagulation for carcinoid metastasis.^{5,6} Complications from the various forms of radiotherapy, such as retinopathy and papillopathy, limit the use of these modalities.⁷

Photodynamic therapy (PDT) has been documented to be an effective therapeutic option for choroidal metastasis, mostly for those from epithelial malignancies.⁸ There have been only a few cases published in which PDT was used to treat carcinoid metastasis. In some of these reports,

PDT was used as a secondary treatment after the tumor failed to respond to radiation and/or chemotherapy.⁹⁻¹¹ Herein, we describe primary use of PDT for multiple choroidal metastases from lung carcinoid tumor.

CASE REPORT

A 51-year-old white man with a 3-week history of blurred vision in the right eye was referred to the Ocular Oncology Service at Wills Eye Hospital for further evaluation. He had no prior

ocular history. His medical history included lung carcinoid tumor treated with resection and systemic chemotherapy 12 years prior to presentation and subsequent liver metastases 2 years prior to presentation that were treated with radiotherapy and systemic chemotherapy.

On examination, VA was 20/50 OD and 20/20 OS. Anterior segment examination of each eye was unremarkable.

On funduscopy, the right eye showed six amelanotic choroidal

AT A GLANCE

- ▶ PDT is an effective therapeutic option for choroidal metastases, mostly for those from epithelial malignancies.
- ▶ Choroidal metastases are generally highly vascular tumors, similar to choroidal hemangioma, in which PDT has been used to resolve subretinal fluid.
- ▶ PDT can be considered as a primary treatment option for choroidal metastases from carcinoid tumors.

lesions scattered throughout the fundus. The two largest tumors were located superior to the macula, each with an approximate basal dimension of 3.0 mm and thickness of 3.3 mm on ultrasonography. The lesion nearest the foveola had produced SRF extending dependently under the foveola (Figure 1A).

The left eye showed two amelanotic choroidal lesions inferonasal to the optic disc with the largest mass 3.0 mm in basal dimension and 2.0 mm in thickness.

Ultrasonography documented the tumors with acoustic density (Figure 1B). OCT confirmed SRF under the foveola in the right eye (Figure 1C). OCT of the left eye demonstrated a normal foveola. These features were consistent with choroidal metastases from lung carcinoid tumor.

Options for management included external beam radiotherapy, plaque radiotherapy, laser photocoagulation, anti-VEGF therapy, and PDT. Given the vision loss in the right eye from SRF, PDT was advised.

A single intravenous dose of verteporfin (Visudyne, Bausch + Lomb) 6 mg/m² was infused, followed by 689-nm diode laser, administered at an intensity of 600 mW/cm², applied directly to the mass superior to the fovea for 83 seconds (50 J/cm²).

Five days after PDT, there was modest increase in SRF under the foveola, which resolved in 3 weeks following intravitreal injection of bevacizumab (Avastin, Genentech).

At 1-year follow up, the treated metastasis in the right eye showed a 50% reduction in thickness (from 3.3 mm to 1.6 mm) (Figure 2A and B). OCT showed complete resolution of subfoveal fluid (Figure 2C), and VA improved to 20/30.

DISCUSSION

Choroidal metastasis from carcinoid tumor has distinct clinical and therapeutic considerations that distinguish this lesion from choroidal metastasis

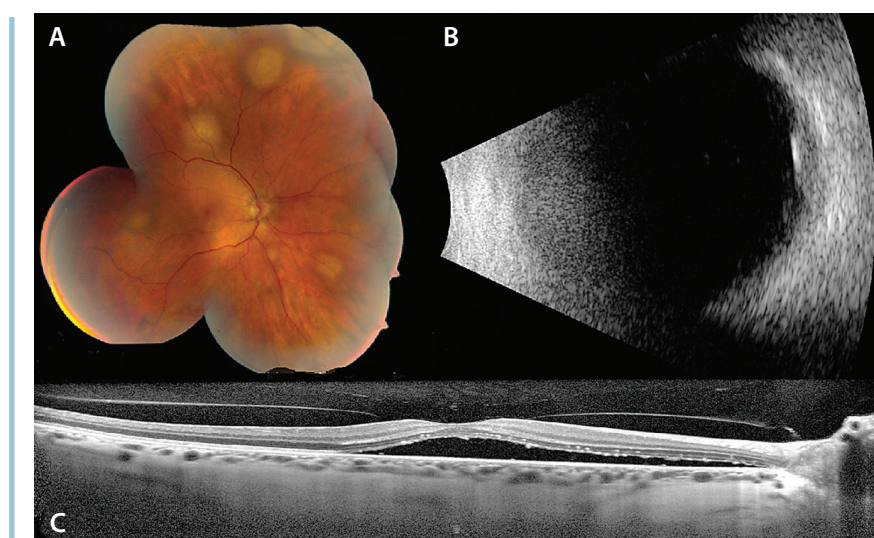


Figure 1. Choroidal metastasis from lung carcinoid tumor in a middle-aged man. At presentation, the right eye revealed six choroidal metastases (A). Ultrasonography documented the tumors with acoustic density and thickness of 3.3 mm (B). OCT showed the tumor immediately superior to the fovea demonstrating a trough of SRF under the foveola, accounting for VA of 20/50 (C).

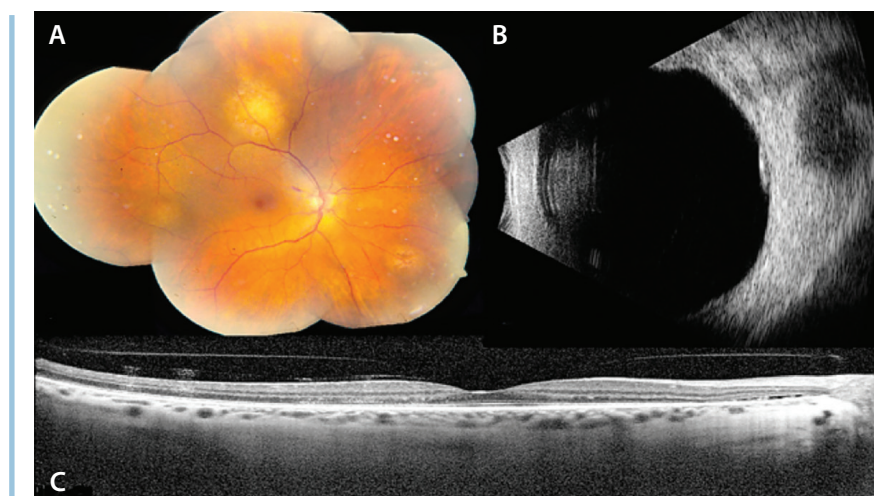


Figure 2. At 1 year after treatment with single session of PDT, the main tumor appeared yellow (A), with reduction in thickness to 1.6 mm (B) and complete resolution of subfoveal fluid with VA of 20/30 (C).

due to other epithelial tumors. Clinically, in contrast to the typically yellow-colored appearance of epithelial metastasis, choroidal metastasis from carcinoid tumor is usually orange or orange-yellow in color.¹² Regarding treatment, although carcinoid metastases are slow-growing tumors with less aggressive behavior and more favorable prognosis than metastases of epithelial origin, these characteristics cause carcinoid metastases to be more resistant to radiotherapy and chemotherapy than

those of epithelial origin.^{10,13}

In a recent analysis of 1,111 patients with choroidal metastasis from all primary sites, the five most common primary sites were breast (37%), lung (26%), kidney (4%), gastrointestinal tract (4%), and skin melanoma (2%).¹ Carcinoid tumor ranked sixth in frequency (2%). For all metastases, the 5-year survival rate was poor, at 23%, but lung carcinoid metastasis demonstrated the most favorable 5-year survival rate, at 92%.¹

**"WE BELIEVE THAT APPLICATION OF
PDT CAN BE CONSIDERED AS A
PRIMARY TREATMENT OPTION FOR
CHOROIDAL METASTASES FROM
CARCINOID TUMORS."**

Choroidal metastases are generally highly vascular tumors, similar to choroidal hemangioma, in which PDT has been successfully used to resolve SRF.^{14,15} Kaliki et al demonstrated the success of PDT for treatment of choroidal metastasis in six of eight cases.¹⁶ PDT acts through two mechanisms on choroidal tumors: through direct tumor destruction via selective cytotoxic activity toward malignant cells,¹⁷ and through promotion of intraluminal photothrombosis in the vascular endothelial cells supplying the tumor.¹⁸

There have been only a few reports on the topic of PDT for carcinoid metastasis to the choroid. In 2004, PDT was used to secondarily treat a carcinoid metastasis that showed no response to external beam radiation and chemotherapy. PDT resulted in a 33% reduction in basal diameter and a 25% reduction in thickness of the mass, as well as resolution of serous retinal detachment with improved VA.¹⁰ In 2013, primary PDT was used to treat carcinoid metastasis, resulting in a reduction in tumor size but visual loss from 20/80 to 20/125 due to photoreceptor damage from chronic SRF.⁹ In 2018, PDT was employed for secondary treatment of choroidal carcinoid metastasis that had not responded to external beam radiotherapy and somatostatin analogue. In that patient, VA improved from 20/200 to 20/60 following resolution of SRF.¹¹

THE CASE FOR PRIMARY PDT

In this patient, we employed primary PDT for choroidal carcinoid metastasis. A 50% reduction in tumor thickness was noted, with complete resolution of SRF allowing VA improvement from 20/50 to 20/30. The slow-growing nature of neuroendocrine-derived cells in carcinoid metastasis could account for the less impressive response to radiotherapy and chemotherapy in these lesions, as previous reports have described.⁹⁻¹¹ Therefore, we believe that application of PDT can be considered as a primary treatment option for choroidal metastases from carcinoid tumors. ■

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