

PDT for Choroidal Metastasis From Renal Cell Carcinoma

For certain cases of ocular metastasis, photodynamic therapy can be an effective option.

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Metastatic tumors in the eye are most commonly found in the choroid.¹ In an analysis of 950 metastatic foci in 520 eyes, the tumors were located in the choroid in 88% of cases.¹ This is believed to be due to the abundant vascular supply to the choroid from the posterior ciliary arteries.² In this analysis, the most common sites of primary cancer to metastasize to the eye included carcinomas of the breast (47%) and lung (21%), while metastasis from the kidney was not often found (2%).¹

The clinical features of choroidal metastases include one or more yellow lesions, generally in the macula or paramacular region, about 3 mm in thickness and 6 mm in base, ranging from tiny to large tumors depending on the stage of discovery.³ Associated features of subretinal fluid and overlying retinal pigment epithelium mottling are typical.¹ Metastasis from renal cell carcinoma (RCC) to the eye can appear different compared with others, as this tumor displays more of an orange color, occasionally with subretinal hemorrhage or exudation.³ Metastases from RCC also tend to be thicker than metastases from other cancers, with mean thickness of 4 mm.¹

MANAGING CHOROIDAL METASTASIS

The management of choroidal metastasis involves strategies for systemic and local control. As a first-line approach, we usually focus on chemotherapy for the primary cancer to control the ocular metastasis and unknown metastases elsewhere. However, if the ocular metastasis is unresponsive to chemotherapy or if there is no evidence of other metastatic involvement, then focal ocular treatments (eg, plaque radiotherapy,

photodynamic therapy [PDT], or external beam radiotherapy) are used.³ In a report from Wills Eye Hospital, PDT was an effective option for choroidal metastasis.⁴ Following is a report of a case in which PDT was used for treatment of choroidal metastasis from RCC.

CASE REPORT

A 75-year-old man who complained of blurred vision for 1 month was referred to Wills Eye Hospital for evaluation of a choroidal lesion in his left eye. Two years prior, he had been diagnosed with stage IV RCC with metastasis to the lungs, mediastinal lymph nodes, skin, and bones. The patient was treated systemically with sunitinib malate, a tyrosine kinase inhibitor, for tumor control. The patient noted an eyelid tumor that responded while on sunitinib malate but reappeared during the 2-week rest period between cycles.

On examination, BCVA was 20/30 in his right eye and 20/60 in his left eye. Intraocular pressure was normal in each eye. External examination revealed a right upper eyelid multinodular vascular mass measuring

At a Glance

- Metastasis from the kidney to the choroid is rare.
- To manage choroidal metastasis, strategies for systemic and local control are needed.
- PDT for metastasis is delivered quickly, can be completed in a single outpatient session, is well tolerated, and has minimal side effects.

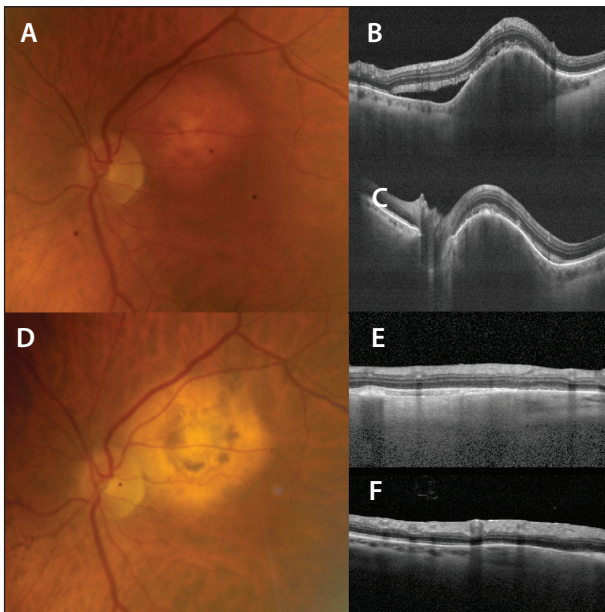


Figure. A 75-year-old man with renal cell carcinoma metastatic to the eye (A). The small amelanotic choroidal metastasis in the papillomacular region appears orange in color (B and C). OCT, vertical (B) and horizontal (C), confirms the choroidal mass and demonstrates overlying subretinal fluid with shaggy photoreceptors (D). Three months after PDT, the metastasis showed complete regression with resolution of subretinal fluid confirmed on OCT, vertical (E) and horizontal (F).

10 mm in basal diameter and 6 mm in thickness, with associated madarosis. The right eye was otherwise unremarkable. Fundus examination of the left eye disclosed an amelanotic choroidal lesion adjacent to the optic disc measuring 3 mm in basal diameter and 2.3 mm in thickness and associated with subretinal fluid (Figure, A). Optical coherence tomography (OCT) confirmed the presence of subretinal fluid overlying the choroidal mass with smooth, dome-shaped surface topography (Figure, B and C).

Both the eyelid and choroidal lesions were consistent with metastatic RCC. The eyelid tumor was treated with full-thickness wedge resection with frozen section control and primary closure. The choroidal metastasis was treated with PDT using verteporfin (6 mg/m^2) in a 30-mL intravenous infusion over a period of 10 minutes. The infusion was followed by 50 J/cm^2 of 689-nm laser light at an intensity of 600 mW/cm^2 applied to the tumor for 83 seconds. PDT was elected instead of plaque radiotherapy to avoid radiation side effects and preserve visual acuity due to the proximity of the lesion to the macula and optic nerve.

Three months after PDT, the patient's visual acuity improved to 20/50 and the tumor showed marked

regression with complete resolution of subretinal fluid, as confirmed on OCT (Figure, D-F).

DISCUSSION

Metastatic RCC is among the most lethal malignancies in adults. The proportion of patients surviving 1 year has been reported at 42%, and less than 10% survive more than 5 years, mainly due to an aggressive and relentless metastatic course.⁵ The most commonly involved sites of RCC metastasis include the lungs (75%), soft tissues (36%), bone (20%), liver (18%), central nervous system (8%), and cutaneous sites (8%).⁶ Choroidal metastasis is rare.¹

Earlier detection of RCC is associated with better prognosis; however, RCC is clinically undetectable in its earliest stages.⁶ RCC often grows unnoticed until metastases are discovered. Only a minority of patients present with the classic triad of flank pain, hematuria, and a renal mass, signifying advanced disease progression with poor prognosis.⁶ Earlier detection through imaging such as abdominal CT and ultrasound may help improve prognosis by finding the disease at an early stage, at which it is more responsive to treatment.⁷

Surgery is the only effective treatment for local RCC. Radical nephrectomy is typically used, and this technique is successful in providing local tumor control. For metastatic RCC, nephrectomy alone has not been shown to increase survival, and it is occasionally performed only to decrease the tumor burden. Instead, sunitinib malate is the first-line treatment to manage metastatic RCC.⁶

Studies have investigated the role of PDT for treatment of primary RCC in the kidney.⁸ In a mouse model with xenotransplanted human RCC, Pomer et al found PDT with tetrahydroxyphenylporphyrin-methoxypolyethylene glycol (THOPP-MPEG) to be successful in inducing necrosis of 3 mm to 5 mm without damage to surrounding healthy tissue.⁸

Our team at Wills Eye Hospital has demonstrated the use of PDT with verteporfin for treatment of choroidal metastasis, with complete tumor regression in seven of nine treated tumors in eight patients.⁴ Verteporfin targets vascular endothelial cells and causes intraluminal photothrombosis. This technique is most appealing for highly vascular tumors such as choroidal metastases that are vulnerable to infarction.^{9,10} Among the benefits of PDT for metastasis, it is a relatively rapid treatment (delivered over 15 minutes), it can be completed in a single outpatient session, and it is well tolerated with minimal side effects. This is remarkable when compared with the alternatives of 5 days for plaque radiotherapy, 1 month for external beam radiotherapy, or several months for chemotherapy. This is an important consideration, especially in light of the relatively guarded

life prognosis of affected patients and the desire for quick but complete therapies to improve quality of life.

SUMMARY

PDT is a safe and effective treatment for small RCC metastasis to the choroid. In the case presented here, the malignancy showed a dramatic and complete response after one PDT session, resulting in tumor regression, subretinal fluid resolution, and improved visual acuity. ■

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