Breast Cancer Metastasis to the Eye: Facts and Figures

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A 65-year-old white woman developed painless blurred vision in the left eye over 10 days. She gave a history of breast carcinoma (estrogen receptor-positive) diagnosed 5 years previously and treated with lumpectomy and radiotherapy. Lymph node sampling was positive, requiring the use of systemic chemotherapy and hormone therapy with anastrozole (aromatase inhibitor). Four years after diagnosis, lung metastases were discovered and treated with fulvestrant (anti-estrogen) intramuscular hormone therapy.

On ocular examination, the best corrected visual acuity was 20/30 in the right eye and 20/80 in the left. Intraocular pressures were normal in both eyes. Fundus examination of the right eye was normal. In the left eye, fundus examination revealed an amelanotic choroidal lesion superior to the optic disc measuring 12 x 11 x 2.6 mm with overlying lipofuscin. A shallow serous retinal detachment extended underneath the foveola. Ultrasonography revealed an acoustically solid plateau-shaped mass on B scan with high internal reflectivity on A scan (Figure 1). These findings were consistent with choroidal metastasis from known breast carcinoma. This solitary ocular metastasis was treated with 4000 cGy of I125 plaque radiotherapy, delivered over a 4-day period. Following plaque radiotherapy, visual acuity was improved in the left eye to 20/30 with complete resolution of the subretinal fluid at the 4-month follow-up. The metastasis regressed to a flat scar of 1.8 mm with surrounding retinal pigment epithelial alterations (Figure 2).

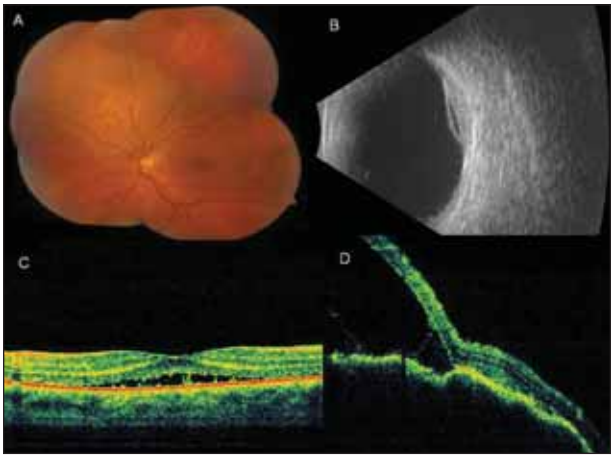

Figure 1. A 65-year-old white woman with blurred vision manifested choroidal metastasis from primary breast carcinoma.The amelanotic choroidal metastasis measured 12 mm in diameter (A). Ultrasonography confirmed 2.6 mm in thickness and shallow overlying subretinal fluid (B). Optical coherence tomography depicted the subtle subfoveal fluid (C).Optical coherence tomography over the tumor showed the irregular surface of the metastasis and thinned detached retina (D).

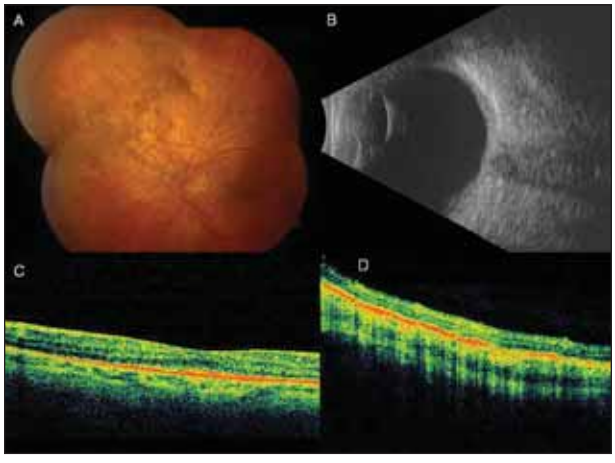

Figure 2. On follow-up, the metastasis showed complete regression and the subretinal fluid resolved, leaving the patient with improved visual acuity. The choroidal metastasis showed complete regression following plaque therapy (A). The tumor regressed to 1.8 mm in thickness (B). Optical coherence tomography showed complete resolution of subretinal fluid (C). Optical coherence tomography over the tumor depicted resolved retinal detachment (D).

TABLE 1. SUMMARY OF PRIMARY SITES FOR UVEAL METASTASES IN 420 CONSECUTIVE PATIENTS.[7]

Primary Cancer Site	% Patients
Breast	47%
Lung	21%
Gastrointestinal	4%
Kidney	2%
Skin	2%
Prostate	2%
Others	4%
Unknown	17%

TABLE 2. SUMMARY OF CLINICAL FEATURES OF CHOROIDAL METASTASIS FROM BREAST CANCER IN 349 EYES OF 254 PATIENTS.[6]

Clinical features of choroidal metastasis from breast cancer	% of patients
Color	
• Yellow	99%
• Brown	1%
Shape	
• Plateau	77%
• Dome	23%
• Mushroom	<1%
Subretinal fluid	
• Yes	64%
• No	36%
Retinal exudate	
• Yes	3%
• No	97%
Retinal hemorrhage	
• Yes	2%
• No	98%

DISCUSSION

Breast carcinoma is the most common cancer to affect women in the United States. The incidence is increasing, and one in eight women is anticipated to develop this malignancy in her lifetime.[1] The American Cancer Society (ACS) estimates cancer prevalence and death based on data from the National Cancer Institute, Centers for Disease Control and Prevention, and the North American Association of Central Cancer Registries. Based on the ACS estimates, it is projected that in the United States in the year 2009, there will be a total of 1,479,350 new cancers and 562,340 deaths from cancer.[2] Interestingly, cancer rates have slightly decreased in men and women over recent years due to reduction in lung, prostate, and colorectal cancers in men and reduction in breast and colorectal cancers in women. It is estimated that the reduction in new cancers and cancer deaths over the past 15 years has spared approximately 650,000 lives.

Breast cancer is estimated to account for 1,910 (<1%) new cancers in men and 192,370 (27%) new cancers in women in 2009. Regarding cancer deaths, it is estimated that 440 men will die from breast cancer in 2009 and 40,170 women will succumb to this malignancy.[2] Metastasis from breast cancer occurs in 23% of women, at median of 5 years.[3] The most common locations for metastasis from breast cancer involve lung (71%), bone (71%), lymph nodes (67%), liver (62%), and pleural lining (50%).[4]

In most reports on breast cancer, ocular metastasis is not discussed. There have been publications specifically focused on the features of choroidal metastasis in breast cancer. Mewis and Young evaluated 67 patients with choroidal metastasis from breast cancer and found that choroidal metastasis was detected at a median of 3 years after diagnosis of primary breast cancer.[5] Demirci and associates from the Oncology Service at Wills Eye Institute reported on 264 consecutive cases of breast carcinoma metastasis to the uvea. This group observed that the most common site of uveal metastasis from breast carcinoma was the choroid (85%) followed by iris (3%) and ciliary body (<1%). The majority of uveal metastases were unilateral (62%). The ocular complaints most frequently associated with uveal metastasis were painless blurred vision (88%), floaters (5%), and photopsia (5%). Asymptomatic patients were seen on occasion (7%). Of those patients with known diagnosis of breast carcinoma, the first site of systemic metastasis was the uvea in 14%. However, in 3% of patients, the uveal metastasis was the first indication of breast cancer. Several ocular treatments were employed for the 254 patients with choroidal metastasis, including external beam radiotherapy (EBRT) (59%), systemic chemotherapy (29%), hormone therapy (9%), plaque radiotherapy (6%), enucleation (1%), and observation (18%). Ocular tumor regression or stability was found in 82% of those treated with EBRT, 81% of those with systemic therapy, and 86% with plaque radiotherapy. Kaplan-Meier estimates showed survival in 65% at 1-year, 46% at 2-year, 34% at 3-year, and 24% at 5-year follow-up.[6]

From a broader perspective on uveal metastasis, most cancers reach the uvea from primary malignancies in breast or lung[7] (Table 1). In a review of 520 eyes with uveal metastases, tumor location was choroid (88%), ciliary body (2%), or iris (9%). The mean (median) number of metastases per eye was two (1%). Visual acuity in affected eyes was more

TABLE 3. SUMMARY OF SITES OF SYSTEMIC METASTASES BEFORE THE DIAGNOSIS OF OCULAR METASTASIS IN A STUDY OF 264 PATIENTS WITH UVEAL METASTASES FROM BREAST CARCINOMA.[6]*

Site of systemic metastases before the diagnosis of ocular metastasis	% of patients
None	44%
Lung	27%
Long bone	26%
Chest wall	7%

**Multiple systemic metastases were present in some patients.*

TABLE 4. SUMMARY OF SITES OF SYSTEMIC METASTASES AFTER THE DIAGNOSIS OF OCULAR METASTASIS IN A STUDY OF 264 PATIENTS WITH UVEAL METASTASES FROM BREAST CARCINOMA.[6]*

Site of systemic metastases after the diagnosis of ocular metastasis	% of patients
Brain	28%
Lung	24%
Long bone	24%
Liver	14%

**Multiple systemic metastases were present in some patients.*

often reduced to 20/200 or count fingers (36%), and less commonly was vision preserved at 20/30 or better (26%). In that series, the clinical features of choroidal metastases included a yellow, plateau-shaped, slightly ill-defined mass of approximately 3 mm in thickness with intact overlying retinal pigment epithelium and often moderate to extensive subretinal fluid (Table 2).[7] Thinner tumors seemed to emanate from primary breast cancer or skin melanoma, while thicker tumors tended to arise from primary gastrointestinal or kidney cancer.[7] In that report, of those with uveal metastasis, about 70% had known nonocular systemic metastasis.[7] After diagnosis of ocular metastasis, further systemic metastases were often discovered, particularly in the brain (Tables 3,4).[6] The mean survival from the time of ocular metastasis to death was 21 months.[6]

There are several radiotherapy treatment options for ocular metastases, including EBRT, charged particle radiotherapy, and plaque radiotherapy. Plaque radiotherapy has proven effective in cases of solitary uveal metastases and those that failed to respond favorably to EBRT.[8,9] In a retrospective review of 36 patients with uveal metastases treated with plaque radiotherapy, 94% of patients experienced tumor regression at a mean follow-up of 11 months.[9] A distinct advantage of plaque radiotherapy is the shorter duration of treatment. Whereas EBRT takes 3 to 4 weeks, plaque radiotherapy requires 2 to 4 days.[8,9] The minimal amount of time the patient invests for the increased quality of life can make it a rewarding endeavor.

As ophthalmic clinicians, it is important for all of us to be aware of the features and outcomes of metastatic disease to the eye, particularly breast cancer. Breast cancer remains the most common cancer in women and carries a profound impact on life prognosis and even ocular and visual prognosis. In this report, we have discussed therapeutic options for uveal metastases. The goal of the treating ocular oncologist is to control the intraocular malignancy with the intent to maximize life and visual prognosis. In many instances, especially when there is diffuse metastatic disease, the goal is to improve patient quality of life. ■

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