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Multimodal Imaging of a Choroidal Metastasis Secondary to Breast Cancer: A Case Report

Meme Kanserine Sekonder Gelişen Koroidal Metastazda Multimodal Görüntüleme: Olgu Sunumu

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ABSTRACT
Metastasis is the most common intraocular malignancy. These lesions are the smallest metastases in the human body that can be directly detected with a biomicroscope. Choroidal metastasis most commonly originates from primary cancer of the breast and lungs. Breast cancer is the most common type of cancer in women. In this case, a 42-year-old female with choroidal metastasis secondary to breast cancer is presented using multimodal imaging.
Keywords: Breast cancer, choroidal metastasis, multimodal imaging.

ÖZET
Metastazlar, en sık izlenen göz içi maligniteleridir. Bu lezyonlar insan vücudunda biyomikroskopla doğrudan tespit edilebilen en küçük metastazları oluşturur. Koroid metastazları en sık meme ve akciğerin primer kanserinden kaynaklanır ve meme kanseri kadınlarda izlenenen en sık kanser türüdür. Bu olguda, meme kanserine sekonder koroid metastazı izlenen 42 yaşındaki kadın hasta multimodal görüntüleme kullanılarak sunulmuştur.
Anahtar Sözcükler: Koroidal metastaz, meme kanseri, multimodal görüntüleme.

Introduction

Breast cancer is the most common type of cancer in women and the most common malignancy in the world. More than 2.26 million newly diagnosed breast cancer cases were observed in women in 2020, accounting for 12.5% of all newly diagnosed cancers (1). Most breast cancer patients in the United States are diagnosed early, only 5% of patients present at the metastatic stage (2). The most common sites of metastasis are the bone, lung, liver, and soft tissues. This study uses multimodal imaging including color fundus photography, fundus fluorescein angiography (FFA), Enhanced depth imaging-optical coherence tomography (EDI-OCT), and ocular ultrasonography (US) to report the case of a 42-year-old female with choroidal metastasis (CM) of breast carcinoma.

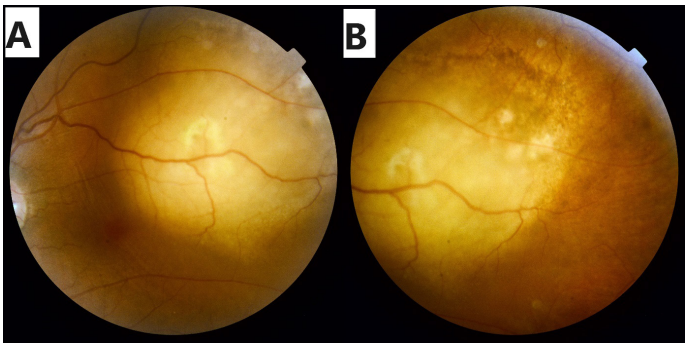

Figure I Color fundus photograph revealed: A) solitary, creamy white-yellowish, elevated choroidal lesion along the superotemporal arcade; B) typical leopard skin pigmentation at the superotemporal border of the metastatic lesion.

Case Report

A 42-year-old female presented with blurred vision in her left eye she had experienced for approximately two weeks. She had a history of infiltrating ductal carcinoma of the breast, for which she had undergone breast-conserving surgery, followed by chemotherapy and radiation therapy four years before. On presentation, the best corrected visual acuity was 10/10 in the right eye and 7/10 in the left. In both eyes, anterior segment examination was unremarkable, and intraocular pressure was normal. The fundus of the right eye was unremarkable. In the left eye, a solitary, creamy white-yellowish, and elevated choroidal lesion measuring approximately 5-disc diameters by 5-disc diameters along the superotemporal arcade (Figure Ia) and typical leopard skin pigmentation at the superotemporal border of the lesion (Figure Ib) were observed. On FFA, relatively hypofluorescence in the early venous phase (Figure IIa) and a non-homogeneous dye leakage in the middle and lower areas of the lesion with pinpoint leakage at the borders of the lesion in the late venous phase (Figure IIb) were perceived. EDI-OCT revealed an elevated dome-shaped choroidal hyporeflective lesion, subretinal fluid with a hyperreflective speckle, compression of the choriocapillaris, hyperreflective alterations in the outer retina, loss of the interdigitation and ellipsoid zone (Figure III). A highly echogenic, plateau-shaped choroidal mass was observed on B-scan US (Figure IV). The patient was diagnosed with CM secondary to breast cancer and referred to the center where she had previously received treatment. Written informed consent was obtained from the patient who participated in this study.

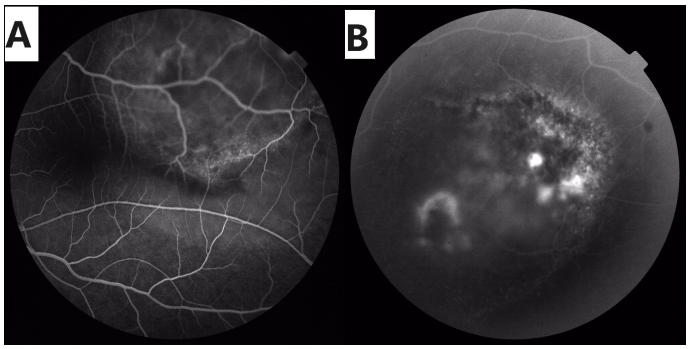

Figure II FFA revealed: A) relative hypofluorescence in the early venous phase; B) non-homogeneous dye leakage in the middle and lower areas of the lesion with pinpoint leakage at the borders of the lesion in the late venous phase.

Discussion

Metastasis is the most common intraocular malignancy than primary cancers. These lesions are the smallest metastases in the human body that can be directly detected with a biomicroscope. Due to its rich vascular supply and fenestrated choriocapillaris, the uveal system is the primary ocular site for metastasis in 99% of cases. Exactly 88% of uveal metastases are observed in the choroid. Choroidal metastatic lesions are localized in 80% of cases between the equator and the macula, 12% at the macula, and 8% between the equator and the ora serrata (3). The choroid is one of the most vascularized tissues in the body, and 80%–85% of ocular blood flow reaches the choroid. Short posterior ciliary arteries are

considered the entry route for uveal embolization of metastatic cells. Some studies indicated that the left eye was more frequently involved, and it has been proposed that this is related to the more direct path to the eye provided by the left common carotid originating from the aorta (4). Optic disc (5) and retina/vitreous (6) metastasis have also been reported extremely rare.

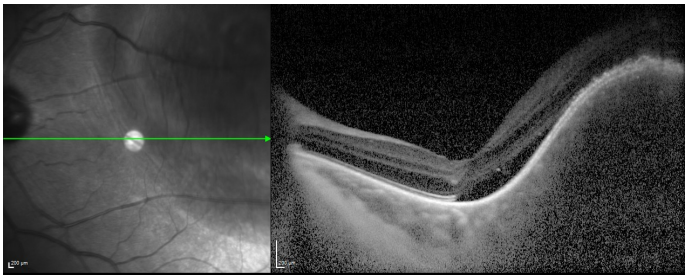

Figure III EDI-OCT revealed an elevated dome-shaped choroidal hyporeflective lesion, subretinal fluid with a hyperreflective speckle, compression of the choriocapillaris, hyperreflective alterations in the outer retina, and loss of the interdigitation and ellipsoid zone.

The incidence of CM has increased over the years due to the improvement in diagnostic techniques and the increase in the survival rate of patients due to available treatments. However, the incidence of CM is higher than reported, probably due to underdiagnosis in patients in poor general conditions. CM usually manifests within 2 to 4 years of the diagnosis of the primary tumor (7). Late presentation of uveal metastasis is extremely rare (8).

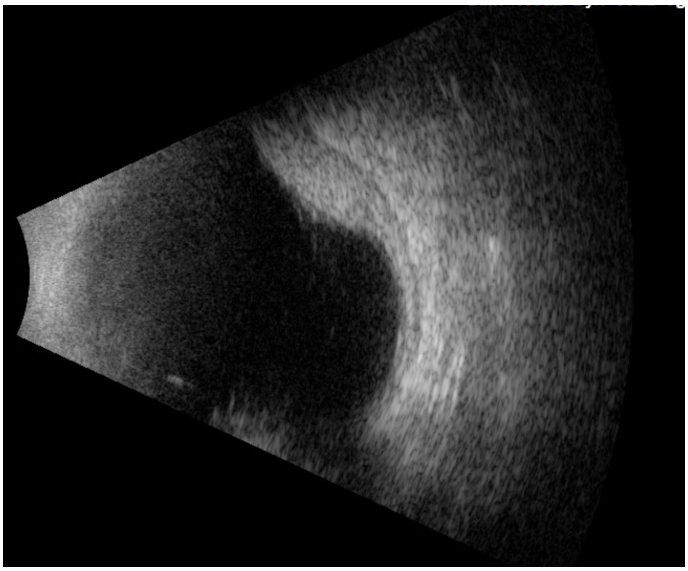

Figure IV B-scan US revealed a highly echogenic, plateau-shaped choroidal mass.

CM most commonly originates from primary cancer of the breast (37%–47% of cases) and lungs (20%–27% of cases). In a study conducted on 420 patients with uveal metastases, 34% had no history of malignancy at the time of ocular diagnosis. In patients with no known malignancy, the primary tumor sites were breast (35%) and lung (7%); the primary site could not be found in approximately 50% of patients. CMs in breast cancer are frequently more bilateral (33%) and multifocal (32%) compared to other primary neoplasms (3).

CM appears as creamy white, pale yellow, or flat plateau-shaped masses with subretinal fluid. Macrophages containing lipofuscin and changes in the retinal pigment epithelium (RPE), which cause brown pigmentation on the lesion, may result in a "leopard skin" appearance. An orange color can be seen in metastases originating from carcinoid tumors and renal cell or thyroid carcinomas (4).

The most common symptom in patients with CM is blurred vision due to macular involvement, subretinal fluid, or exudative retinal detachment. Other symptoms include photopsia, floater, metamorphopsia, scotoma, and ocular pain. Ocular pain may develop due to inflammation, tumor necrosis, neovascular glaucoma, microscopic scleral involvement, and invasion of the ciliary nerves. No symptoms are observed in 13% of patients (3,4,9).

In differential diagnosis, amelanotic melanoma or naevus, lymphoma, choroidal hemangioma, choroidal osteoma, eccentric disciform process, and posterior scleritis should be considered. CM can generally be diagnosed by fundus examination, but auxiliary diagnostic methods and tools should sometimes be used. Furthermore, these diagnostic tools can be beneficial in predicting the clinical course of metastatic lesions.

FFA may help distinguish CM from choroidal melanoma. In FFA, the lesion, which usually shows relative hypofluorescence in the arterial filling and early venous phase, gradually acquires hyperfluorescence in the late venous phase. However, hyperfluorescence is seen at earlier stages in amelanotic melanoma and hemangioma, mostly in the form of spots. CM also contains dilated retinal capillaries with a pinpoint leakage at the tumor border in 74% of cases, compared to melanoma in 16% of cases.

The double circulation pattern, mostly seen in choroidal melanoma, is rare in CM (10). Indocyanine green angiography shows a blockage in choroidal fluorescence and irregular staining on the surface. US allows the differentiation of metastases from other intraocular masses, especially melanomas. On A-scan US, the metastatic lesion shows a high initial spike, moderate-high internal reflection, and a high spike belonging to the sclera at the posterior border. B-scan US demonstrates moderate to high acoustic echogenicity. These findings differentiate choroidal metastatic masses from uveal melanomas, which are usually mushroom-shaped and show acoustic space and choroidal excavation on US. The internal acoustic reflectivity of choroidal hemangioma is higher than in choroidal metastatic lesions. CMs are generally small, posteriorly located, and suitable for OCT imaging. EDI-OCT may be more sensitive than US in evaluating small metastatic tumors at presentation and after treatment (11). Neoplasms that are 1 mm thick may not be detected by US, but EDI-OCT can detect these subclinical CMs (12). An irregular (lumpy-bumpy) anterior contour, overlying choriocapillaris thinning, plateau-shaped tumor, posterior shadowing, shaggy photoreceptors, subretinal fluid with high reflective speckles, thickening of RPE, loss of external limiting membrane, abnormality of photoreceptors, and loss of inner segment/outer segment junction are common EDI-OCT imaging features of CM (11-13). The most characteristic finding is an irregular "lumpy-bumpy" anterior tumor surface of a metastatic lesion. Highly reflective speckles in the subretinal fluid are thought to be shedded photoreceptor outer segments. "Shaggy photoreceptors" can describe the swelling and elongation of the photoreceptors. Improvement of shaggy photoreceptors has been reported in treated patients with CM and is associated with the resolution of subretinal fluid (11). While no blood flow within the metastatic lesion and absence of pathological blood flow at external retinal layers are observed in OCT-angio imaging, a dense irregular vascular network is observed in choroidal melanomas, hemangiomas, and osteomas (14). It has been suggested that the lack of blood flow within the metastatic lesion may result from shadowing artifacts of the RPE on the underlying tumor neovascularization or by a fringe washout due to higher flow speed inside the tumor (4).

In conclusion, it should be remembered that visual symptoms may be a sign of intraocular metastatic lesions in patients with a history of malignancy. The distinctive characteristics of choroidal lesions can be better understood with multimodal imaging.

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