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Multimodal Imaging in Diagnosis of Choroidal Metastasis in Breast Carcinoma

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Abstract: ***Intraocular metastasis is the most common malignancy of the eye in adults. It is commonly noted in the uveal tract with choroid being the most common site due to its high vascularity. Carcinoma breast is the most common primary malignancy that accounts for choroidal metastasis in females and carcinoma of lung is the most common cause in males. Here in this article, we report a case of 54-year female who had carcinoma breast with choroidal metastasis in her left eye and highlight the role of non-invasive multimodal imaging viz Fundus Autofluorescence, ED-OCT and B scan in diagnosing the same.***

Keywords: Choroidal metastasis, Breast carcinoma, Fundus autofluorescence, Enhanced depth -OCT

1. Introduction

Intraocular metastasis is the most common malignancy of the eye in adults. It is commonly noted in the uveal tract with choroid beingthe most common site due to its high vascularity.[1]The underlying primary malignancy originates mainly from the skin, gastrointestinal tract, lung, breastor the genitourinary tract.[2]Carcinoma of breast is the most common primary malignancy that accounts for choroidal metastasis (CM) in females and carcinoma of lung is the most common cause in males.[3] Here in this article, we present a case of carcinoma breast with choroidal metastasis and highlight the role of multimodal imaging in diagnosing the same.

2. Case Report

A 54-year-old female presented with blurred vision in her both eyesforlast one-month duration.She had a medical history of carcinoma breast for which she underwent 11 cycles of chemotherapy one year ago. At the time of presentation patient was off all chemotherapeutic agents. On examination her best corrected visual acuity was 6/12in her right eye and 6/9in the left eye.Anterior segment examination showed NS 2 cataractous lens in both the eyes. Relative afferent pupillary defect was not present in either eye and intraocular pressure was 14 mmHg in both eyes.Dilated fundus examination of right eye was completely normal (figure 1. a, b) however in left eye multiple foci of yellowish white sub-retinal lesions with adjacent exudativeretinal detachment was present in superotemporal quadrant approaching the macula. (Figure 1. c, d)

Fundus Autofluorescence (FAF) (TRC 50DX, Topcon, Japan) showed granular hypo-auto fluorescentpatches with adjacent hyper-auto fluorescent area delineating the site of metastases in the left eye (Figure 1. e, f).Enhanced-depth imaging optical coherence tomography (EDI-OCT) of left eye shows subretinal fluid at the posterior pole and a choroidal elevation with lumpy – bumpy contour of the retinal pigment epithelium, compression of overlying choriocapillarieswith overlying subretinal fluid and hyper-reflective dots extending to outer retina (Figure 2. a, b, c, d). Ultrasound (USG) examination of LE shows a flat homogenous hyper-reflective mass with high reflectivity with thickening of RCS complex in superotemporal quadrant with an overlying uniform homogenous hypo-reflective space suggestive of shallow sub retinal fluid (Figure 2. e, f). FAF and OCT examination of the right eye was within normal limits.

3. Discussion

Most common intraocular malignancy in adults is choroidal metastasis. The incidence of ocular metastasis from breast carcinoma is reported between 8 to 10%.[3] It can present as isolated or multiple flat or slightly elevated non pigmented lesions with poorly defined margins that may be associated with overlying pigment epithelial alterations, subretinal fluid and lipofuscin accumulation.[4] In our case we had multiple metastasis posterior to the equator which is the most common site, as the major blood supply to choroid is by posterior ciliary arteries.[1]

Diagnosis of choroidal metastasis is typically made by patient's medical history, clinical appearance, fluorescein angiographic (FA) and indocyanine green angiographic (ICGA) findings. However, poor general health of these patients makes these invasive examinations difficult to perform. So recently, FAF and EDI-OCT have been used to improve the diagnostic evaluation.

In our case, FAF shows hypo-autofluorescent patches surrounded by a sea of hyper-autofluorescence. Hyper-autofluorescent areas correlate to subclinical RPE accumulation of lipofuscin while hypo-autofluorescent patches along tumour margins and overlying surface, indicate that the RPE cells around and overlying the tumour are damaged.[6] This pattern of mixed hypo and hyper autofluorescence is known as "leopard spotting". [8] (figure 1. e, f)

EDI-OCT shows choroidal elevation and choriocapillaries compression with lumpy-bumpy contour of the retinal pigment epithelial layer which is characteristically seen in choroidal metastatic neoplasms.[9] This is in contrast to

nevus and melanoma that usually show smooth, dome-shaped topography.[5] Overlying the lesion, extensive subretinal fluid and a prominent line of shaggy photoreceptors is seen. Pigment clumping is also evident in imaging and appears as high reflective intraretinal foci.[9] Known OCT findings in cases of choroidal metastasis includes overlying SRF (65-75%), shaggy photoreceptors (75%) and speckles (i.e., shed photoreceptor outer segments or pigment clumps within the sub retinal fluid) (67%).

B scan shows homogenous mass with moderate to high internal reflectivity because metastasis from the breast has solid epithelial nests or glandular structures, which act as echo-producing interfaces, resulting in high reflectivity.[7] The internal acoustic reflectivity of intraocular metastatic tumours is higher than that of most uveal melanomas but not as high as choroidal haemangiomas. lateral margins of CM are poorly defined.[10] USG enables localization of the intraocular mass, estimation of its size, and characterization of its tissue reflectivity.

4. Conclusion

For a patient presenting with choroidal tumour, clinical evaluation should be supplemented with investigatory modalities like auto fluorescent imaging, B scan and SD OCT, for better delineation of the features of the tumour and to diagnose choroidal metastasis. Following which, the systemic primary malignancy should be looked for. However, up to one-third of patients have no history of cancer at the time of CM diagnosis, and ocular manifestations are the first sign of systemic disease. Therefore, understanding on the part of ophthalmologists regarding diagnostic features of CM on these multimodal imaging might help in prompt diagnosis of a primary malignancy and thus prove lifesaving to the patient.

Figure Legends

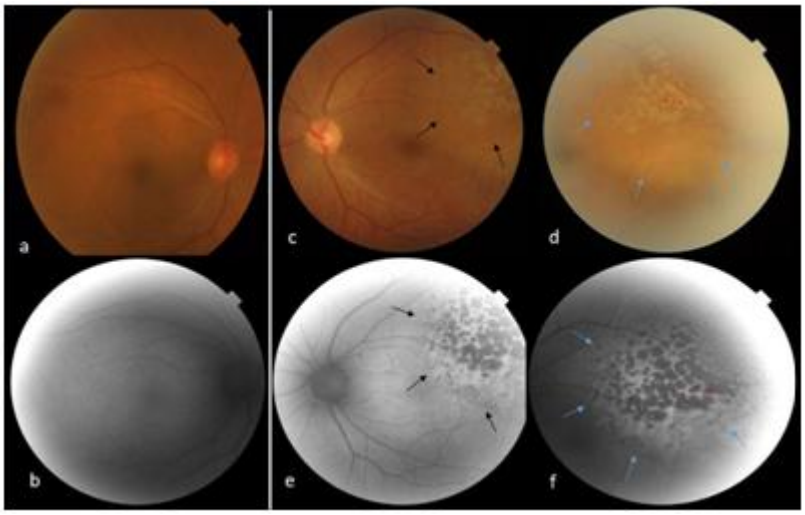

Figure 1: (a) Fundus photograph of right eye showing posterior pole. (b) Autofluorescence showing normal macular fluorescence (c, d) Colour fundus photograph of left eye showing multiple yellow-white sub retinal lesions with focal exudative retinal detachment. (e, f) Autofluorescence showing leopard spot pattern of mixed hyper and hypoautofluorescence

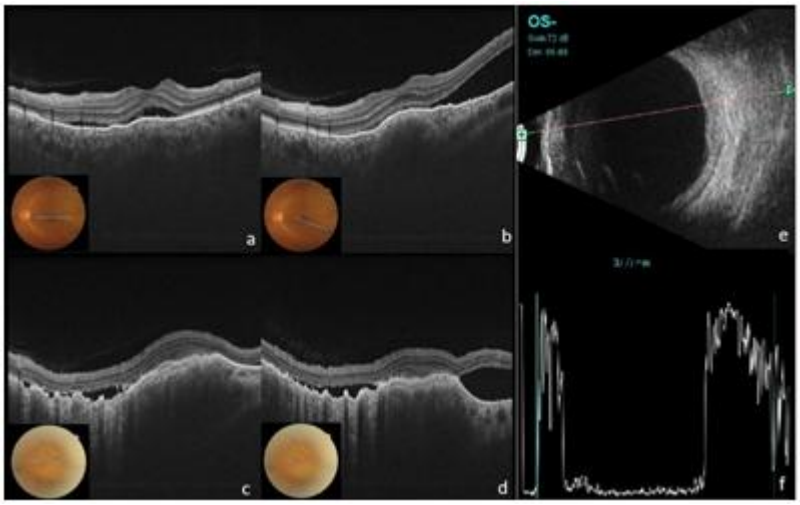

Figure 2: (a, b) EDI-OCT via macula showing serous retinal detachment with shaggy photoreceptors (c, d) EDI-OCT via site of choroidal metastasis showing choroidal elevation with compression of choriocapillaris, lumpy bumpy RPE, disruption of ORL at the site of choroidal mass lesion, and intraretinal speckles. (e, f) B Scan showing a flat homogenous hyper-reflective mass with high reflectivity with thickening of RCS complex in superotemporal quadrant with an overlying uniform homogenous hypo-reflective space suggestive of shallow sub retinal fluid.

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