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Flat Choroidal Nevus Inaccessible to Ultrasound Sonography Evaluated by Enhanced Depth Imaging Optical Coherence Tomography

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Key Words

Choroidal nevus · Enhanced depth imaging · Optical coherence tomography

Abstract

Purpose: To demonstrate the usefulness of enhanced depth imaging optical coherence tomography (EDI-OCT) in investigating choroidal lesions inaccessible to ultrasound sonography.

Methods: In a 60-year-old woman with an asymptomatic choroidal nevus, normal OCT was used to observe the macula and EDI-OCT to image the choroidal nevus that was inaccessible to ultrasound. The exact location of the lesion in the choroid and the dimensions of the nevus were measured.

Results: The lesion was located in the superior macula, and the nevus was homogeneous in its reflectivity. We observed a thickened choroid delineated by the shadow cone behind it, measuring $1,376 \times 325 \mu\text{m}$ in the larger vertical cut and $1,220 \times 325 \mu\text{m}$ in the larger horizontal cut in an image with a 1:1 pixel mapping and automatic zoom. The macular profile and thickness were both normal.

Conclusions: EDI-OCT appears to be an excellent technique for measuring choroidal nevi and all choroidal lesions accessible to OCT imaging by depicting their exact location in the choroid, their dimensions, and their demarcation from the surrounding healthy tissue, thus allowing for a more efficient and accurate follow-up.

Introduction

Choroidal nevus is the most common tumor of the ocular fundus, present in 7% of the white population [1, 2]. Despite its benign nature, it presents a risk of visual loss and visual field loss, and can rarely transform into malignant melanoma [2]. Optical coherence tomography (OCT) and ultrasonography have been used for imaging choroidal nevi. Recently, enhanced depth imaging OCT (EDI-OCT) has been used in order to measure choroidal thickness in normal and pathologic eyes [3, 4]. Here, we report a case of a flat choroidal nevus inaccessible to ultrasound sonography that was evaluated by EDI-OCT.

Case Report

A 60-year-old woman was referred to our department with an asymptomatic choroidal nevus in her left eye. Her best-corrected visual acuity was 20/20 in both eyes. Slit lamp and fundus examinations of the right eye were normal. In the left eye, the anterior segment was normal; however, on funduscopy a choroidal nevus located in the superior macula was observed (fig. 1). Spectral-domain (SD) OCT (Heidelberg Engineering, Heidelberg, Germany) revealed normal foveal thickness (fig. 2). The flat nevus was inaccessible to ultrasound sonography, and EDI-OCT was used to image its posterior surface (fig. 3).

EDI-OCT is a new technique that consists of positioning a Heidelberg SD-OCT close enough to the eye in order to obtain an inverted image, averaged for 100 scans. Seven sections are obtained and measured with the Heidelberg SD software. The advantage of this technique is that the sensitivity of the imaging in deeper tissue layers is increased, and thus the obtained measurements are more accurate. We employed this technique to image the location of the nevus in the choroid and obtain its dimensions as a reference measure for the follow-up examination (fig. 3).

Heidelberg SD-OCT provides an exact correlation between the OCT image and the infrared photograph. As infrared light is absorbed by melanin, the nevus appears brighter. In the EDI-OCT image, the lesion appears homogeneous and hyperreflective at the level of the large choroidal vessels, masking the underlying choroidal vasculature.

The choroidal thickness at the level of the nevus appears greater than the neighbor choroid (fig. 3). All measurements were obtained manually. The diameter of the nevus was calculated based on the presence of a shadow cone created by the lesion's lateral borders. The choroidal thickness was measured based on the hyperreflectivity between the Bruch's membrane and the beginning of the shadow cone (fig. 3). The choroid measured $1,220 \times 325 \mu\text{m}$ in the larger horizontal cut and $1,376 \times 325 \mu\text{m}$ in the larger vertical cut in an image with a 1:1 pixel mapping and automatic zoom (fig. 3).

Conclusion

EDI-OCT appears to be an excellent technique for evaluating flat choroidal nevi that are inaccessible to ultrasound sonography and accessible to OCT imaging, displaying simultaneously the lesion and the retinal changes [5]. It is a reproducible examination that allows depiction of the exact location of the nevi in the choroid, their dimensions and their demarcation from the surrounding healthy tissue. To date, the software available for SD-OCT does not allow for objective measures [5]. The subjective measures obtained are useful upon comparison with the follow-up images. In order to limit the possibility of bias, these follow-up images must be obtained and compared with the same SD-OCT machine. We believe that this technique is clinically useful and, together with color fundus photography, can provide a more efficient and accurate follow-up of choroidal nevi.

Disclosure Statement

The authors declare that they have no financial interest and no commercial associations.

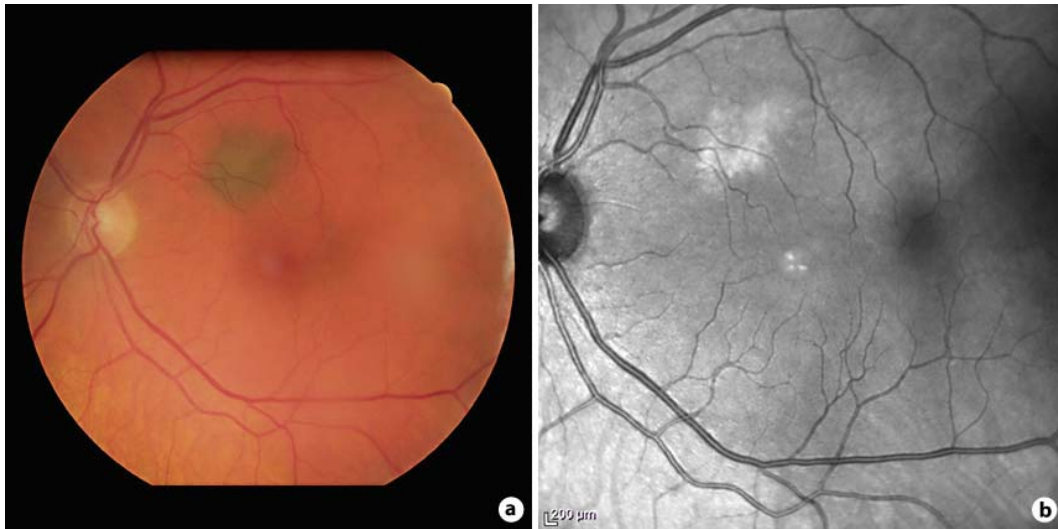


Fig. 1. Left eye. **a** Color fundus image showing the pigmented choroidal nevus in the superior macula. **b** Infrared photograph. The nevus corresponds to the hyperreflective area in the superior macula.

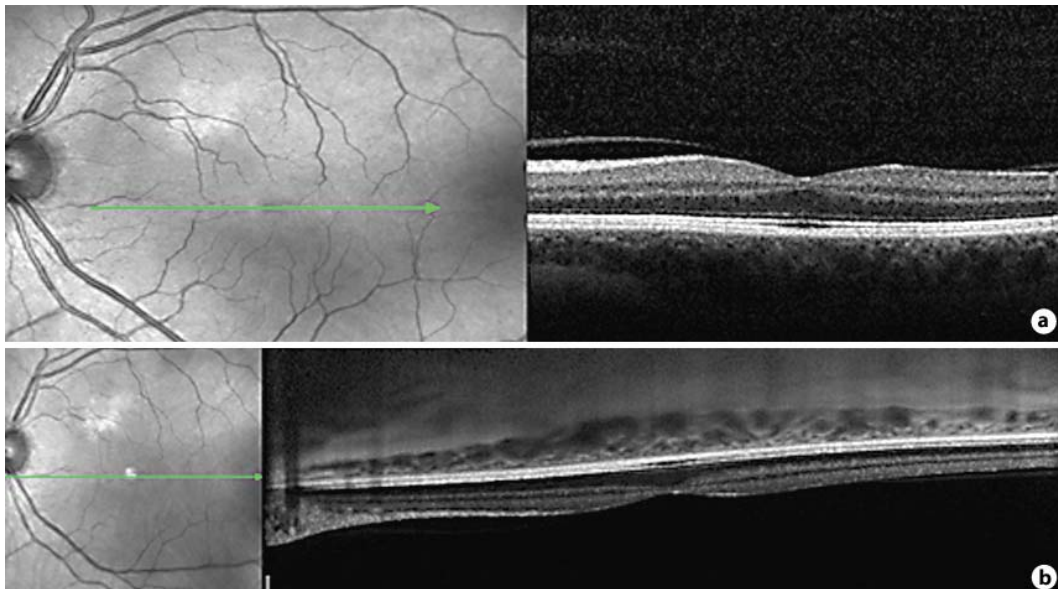


Fig. 2. Left eye. Normal OCT (**a**) and EDI-OCT (**b**) showing regular macular profile and thickness.

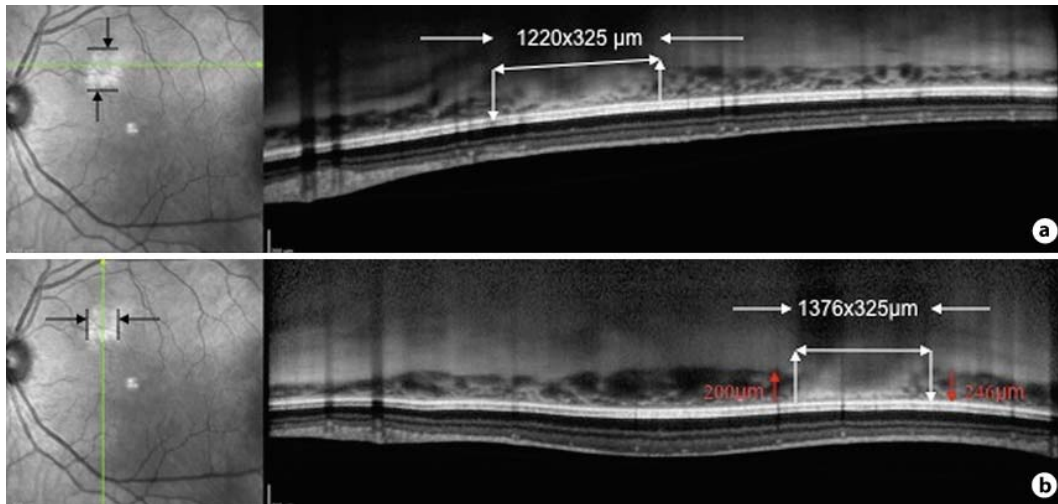


Fig. 3. Infrared photographs and EDI-OCT of the patient's left eye. Horizontal cut (a) and vertical cut (b). The choroidal thickness at the level of the nevus appears greater than the neighbor choroid (a). The choroidal thickness is measured based on the hyperreflectivity between the Bruch's membrane and the beginning of the shadow cone (325 μm). The diameter of the nevus is calculated based on the shadow cone in the larger horizontal and vertical cuts in an image with a 1:1 pixel mapping and automatic zoom (1,220 \times 1,376 μm). There is neither retinal pigment epithelium detachment nor rupture of the photoreceptor's line in the overlying retina. In the infrared image, the nevus corresponds to the circumscribed hyperreflective area localized in the choroid. The location of the OCT cut images strictly corresponds to that of the infrared photographs.

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