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Enhanced Depth Imaging Features of a Choroidal Macrovessel

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Abstract

Purpose—To report a case of a choroidal macrovessel imaged using enhanced-depth imaging spectral domain optical coherence tomorgraphy (EDI SD-OCT) and describe the choroidal features.

Methods—Case report. A 42-year-old man presented with metamorphopsia. Multimodal imaging, including color fundus photography, near infrared reflectance (NIR), and EDI-OCT was used to describe a choroidal macrovessel.

Results—Initial ophthalmic examination revealed a serpentine-shaped subretinal pattern deep to the retina near the fovea. When the color image was subjected to a red-filter, a large diameter vessel could be seen coursing from the fovea to the temporal macula. EDI-OCT of the choroidal macrovessel revealed a thickened choroid, and mild deformation of both the ellipsoid zone and the choroidal-scleral junction. En face SD-OCT at the level of the choroid demonstrated the anomalous vessel.

Conclusions—EDI-OCT and en face OCT, used in conjunction with other imaging modalities, can be used to demonstrate the presence and pattern of a choroidal macrovessel. A thickened choroid and overlying outer retinal indentation was observed in association of the choroidal macrovessel. These imaging tools can help distinguish this condition from other diagnoses with a similar appearance, such as ophthalmomyiasis.

Keywords

Choroidal macrovessel; En face imaging; Enhanced depth imaging; Optical coherence tomography; Metamorphopsia; Retinal macrovessel

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Enhanced depth imaging spectral-domain optical coherence tomography (EDI-OCT) has emerged as a non-invasive technique to visualize the cross-sectional architecture of the choroid.[1,2] It has also provided the ability to obtain quantitative assessments of choroidal thickness in a variety of conditions. En face OCT has enhanced interpretation of en face angiographic testing in a variety of retinal disorders by overlaying high-resolution structural features.[3] Near infrared reflectance imaging has also been used to detail choroidal abnormalities in a variety of diseases, such as choroidal neurofibromatosis and acute macular neuroretinopathy.[4,5] In this report, we describe novel findings, such as metamorphopsia, a thickened choroid, and focal deformation of the choroidal-scleral junction, in a patient who presented with a choroidal macrovessel, an unusual, anomalous vascular structure.[6,7]

CASE REPORT

A 42 year-old Caucasian female was referred for metamorphopsia in the left eye. She had no previous past medical history, did not take any oral or topical medication, and denied travel abroad. Visual acuity was normal in both eyes and examination of the posterior segment revealed a large tortuous choroidal vessel involving the fovea with mild overlying RPE changes (Figure 1A). The red channel of the color fundus photograph clearly highlighted this structure (Figure 1B). Early phase fundus angiography showed early filling of the vessel, confirming its arterial origin (data not shown). Near infrared reflectance (NIR) showed a subtle hyperreflective serpentine-shaped structure temporal to the fovea (Figure 2, left panels). EDI-OCT revealed a thickened choroid and an enlarged vascular structure that spanned the entire thickness of the choroid, from the choriocapillaris to the choroid-scleral junction (Figure 2). Near the fovea, there was an abnormal ellipsoid zone (EZ), including retinal pigment epithelium (RPE) hyperreflectivity, and focal EZ compression with reduced outer nuclear layer (ONL) thickness, as well as an indented choroidal-scleral junction (CSJ, Figure 2). Transverse EDI-OCT sections of the choroidal macrovessel demonstrated its narrowing as it coursed temporally through the macula (Figure 2). False-color en face SD-OCT imaging at the level of the choroid was overlayed on the NIR image, which revealed the path of the macrovessel through the temporal macula (Figure 3).

DISCUSSION

Choroidal macrovessels were first described by Lima et al. as anomalous choroidal vessels with normal indocyanine green (ICG) fluorescence in the early phase with hypofluorescence throughout its course in the late phase, without leakage.[6] These vessels are located within the inner choroid, temporal to the fovea with a tortuous configuration.[6] No overlying retinal abnormalities were noted. More recently, Ehlers et al. used multimodal imaging, including EDI-OCT, to describe a case that was associated with mounding and hyperpigmentation of the RPE, debris in the subretinal space, and changes in the ONL thickness.[7] In contrast, our case had subtle EZ and RPE changes more prominent than Lima et al., but not as severe as reported by Ehlers at al.[6,7] In both cases, the patients were asymptomatic and neither of the previous reports visualized the CSJ. Thus our patient's metamorphopsia, and our findings of a vessel occupying the entire thickness of the choroid, with associated increased choroidal thickness and indented CSJ, have not been previously been reported in association with

choroidal macrovessels. It is possible that focal replacement of the choriocapillaris by the macrovessel and its mass effect against the RPE and EZ could induce changes in the overlying perifoveal retina, resulting in metamorphopsia, and similar to findings in our recently reported case series of sclerochoroidal calcification analyzed by EDI-OCT.[2]

Choroidal macrovessels are distinct from congenital retinal macrovessels, in that the latter are often larger and more tortuous than normal retinal vessels. Furthermore, they are responsible for the perfusion of a larger area of retinal tissue than traditional retinal vessels.[8] These congenital retinal macrovessels may be associated with ischemia, leakage, preretinal neovascularization following thrombotic occlusion.[4] We did not see these findings with our report, nor did two previous published cases of choroidal macrovessels describe these findings.[6,7] Instead, EDI-OCT of the choroidal macrovessel revealed an enlarged lumen occupying the entire choroidal thickness to surrounding choroidal vessels, indentation of the CSJ and EZ with RPE and ONL changes, and an overall thickened choroid.

The differential diagnosis of choroidal macrovessel includes ophthalmomyiasis, choroidal vascular lesions and neoplasms (such as circumscribed and diffuse hemangioma), vortex varices, retinochoroidal anastomosis and inflammatory choroidopathies. The patient had no history of international travel or inflammation, or subretinal fluid, which made ophthalmomyiasis[9] and other causes of inflammation unlikely. The patient did not have systemic findings that would suggest Sturge-Weber syndrome, and lacked a dome shaped choroidal lesion with subretinal fluid or angiographic leakage; excluding circumscribed and diffuse choroidal hemangioma. The lesion was arterial, and not in a region of a vortex varix. There were no vessels contiguous with the retina and choroid, which excluded retinochoroidal anastomosis.

This is the first report to describe metamorphopsia, en face OCT, and EDI-OCT findings such as a narrow vascular element occupying the entire thickness of the choroid, with associated increased choroidal thickness and indented CSJ, in association with a choroidal macrovessel. This non-invasive technique may serve as a useful adjunct to clinical examination and other imaging modalities in order to distinguish this condition from other choroidal pathologies.

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REFERENCES

1. Spaide RF, Koizumi H, Pozzoni MC. Enhanced depth imaging spectral-domain optical coherence tomography. Am J Ophthalmol. 2008 Oct; 146(4):496–500. [PubMed: 18639219]
2. Rao RC, Choudhry N, Gragoudas ES. Enhanced depth imaging spectral-domain optical coherence tomography findings in sclerochoroidal calcification. Retina. 2012 Jun; 32(6):1226–1227. [PubMed: 22572772]
3. van Velthoven ME, de Vos K, Verbraak FD, Pool CW, de Smet MD. Overlay of conventional angiographic and en-face OCT images enhances their interpretation. BMC Ophthalmol. 2005; 5:12. [PubMed: 15953392]

4. Rao RC, Choudhry N. Enhanced depth imaging spectral-domain optical coherence tomography findings in choroidal neurofibromatosis. Ophthalmic Surg Lasers Imaging Retina. 2014 Sep-Oct; 45(5):466–468. [PubMed: 25153660]
5. Fawzi AA, Pappuru RR, Sarraf D, et al. Acute macular neuroretinopathy: long-term insights revealed by multimodal imaging. Retina. 2012 Sep; 32(8):1500–1513. [PubMed: 22846801]
6. Lima LH, Laud K, Chang LK, Yannuzzi LA. Choroidal macrovessel. Br J Ophthalmol. 2011 Sep; 95(9):1333–1334. [PubMed: 20682950]
7. Ehlers JP, Rayess H, Spaide RF. Isolated choroidal macrovessel: a tracklike choroidal lesion. Can J Ophthalmol. 2014 Dec; 49(6):e158–e160. [PubMed: 25433756]
8. Jager RD, Timothy NH, Coney JM, et al. Congenital retinal macrovessel. Retina. 2005 Jun; 25(4): 538–540. [PubMed: 15933610]
9. Ahmed E, Houston MA, Husain D. High-definition spectral domain OCT of a subretinal nematode. Eye (Lond). 2010 Feb; 24(2):393–394. [PubMed: 19444290]

Summary Statement

The structure of a choroidal macrovessel is analyzed using enhanced depth imaging spectral-domain optical coherence tomography (EDI-OCT). Enlarged vessel caliber, indentation of the choroidal-scleral junction, and increased choroidal thickness are key features reported for the first time. EDI-OCT may allow for a non-invasive assessment and diagnosis of this condition.

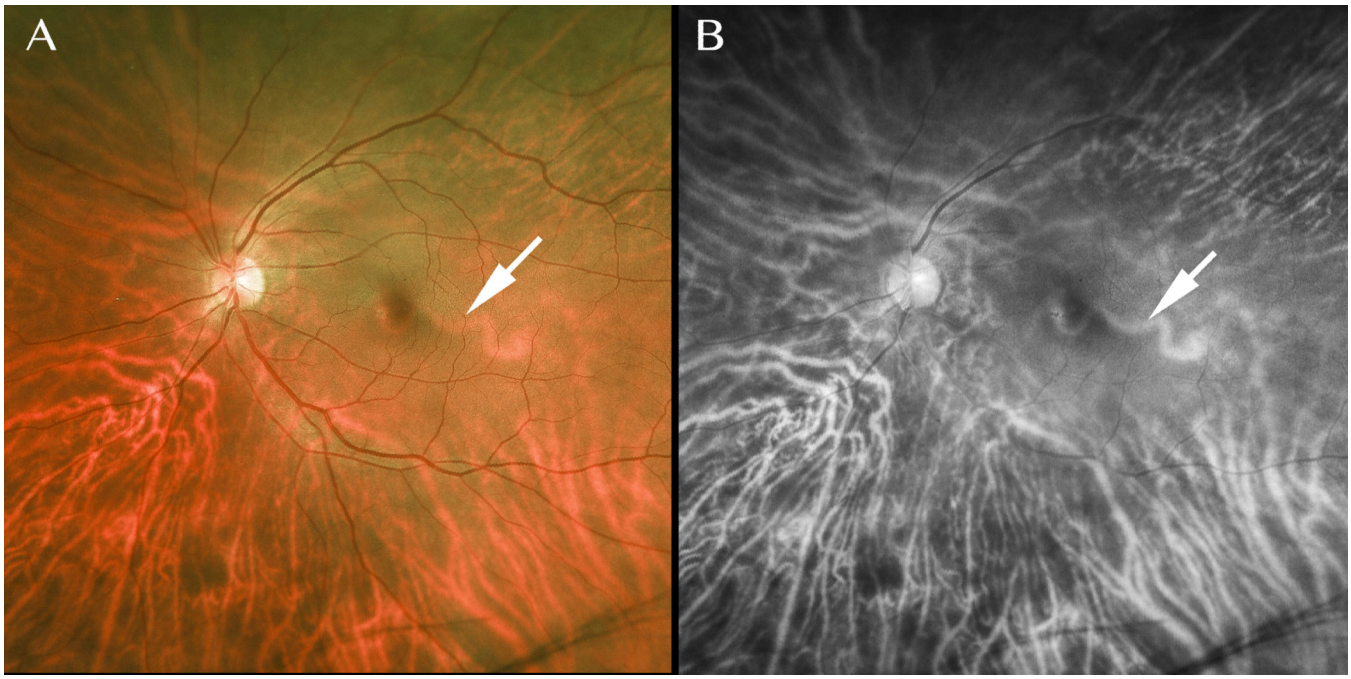

Figure 1.

(A) Color fundus photograph of the left eye demonstrating a large caliber tortuous choroidal vessel (arrow); choroidal macrovessel. (B) Red filter photograph of the left fundus demonstrating enhanced choroidal detail and choroidal macrovessel traversing the fovea (arrow).

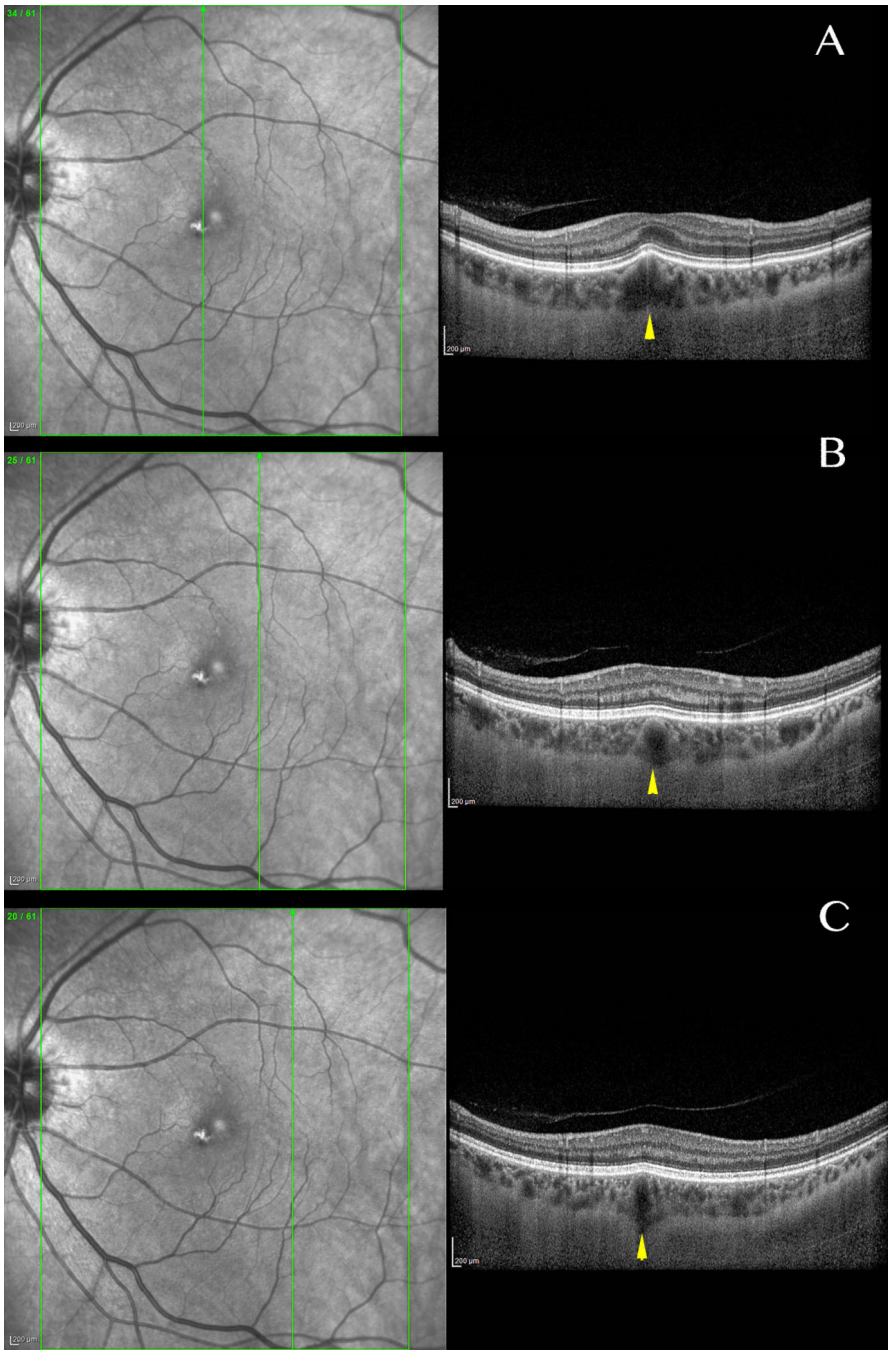

Figure 2.

(A–C) Enhanced Depth Imaging SD-OCT through the choroidal macrovessel at three points along its course revealed a large caliber choroidal vascular shadow (arrowhead), indenting the RPE proximally and the choroidal-scleral junction distally. The near infrared reflectance images are left of the corresponding EDI-OCT image. Choroidal thickness in (A) was measured to be 431 microns.

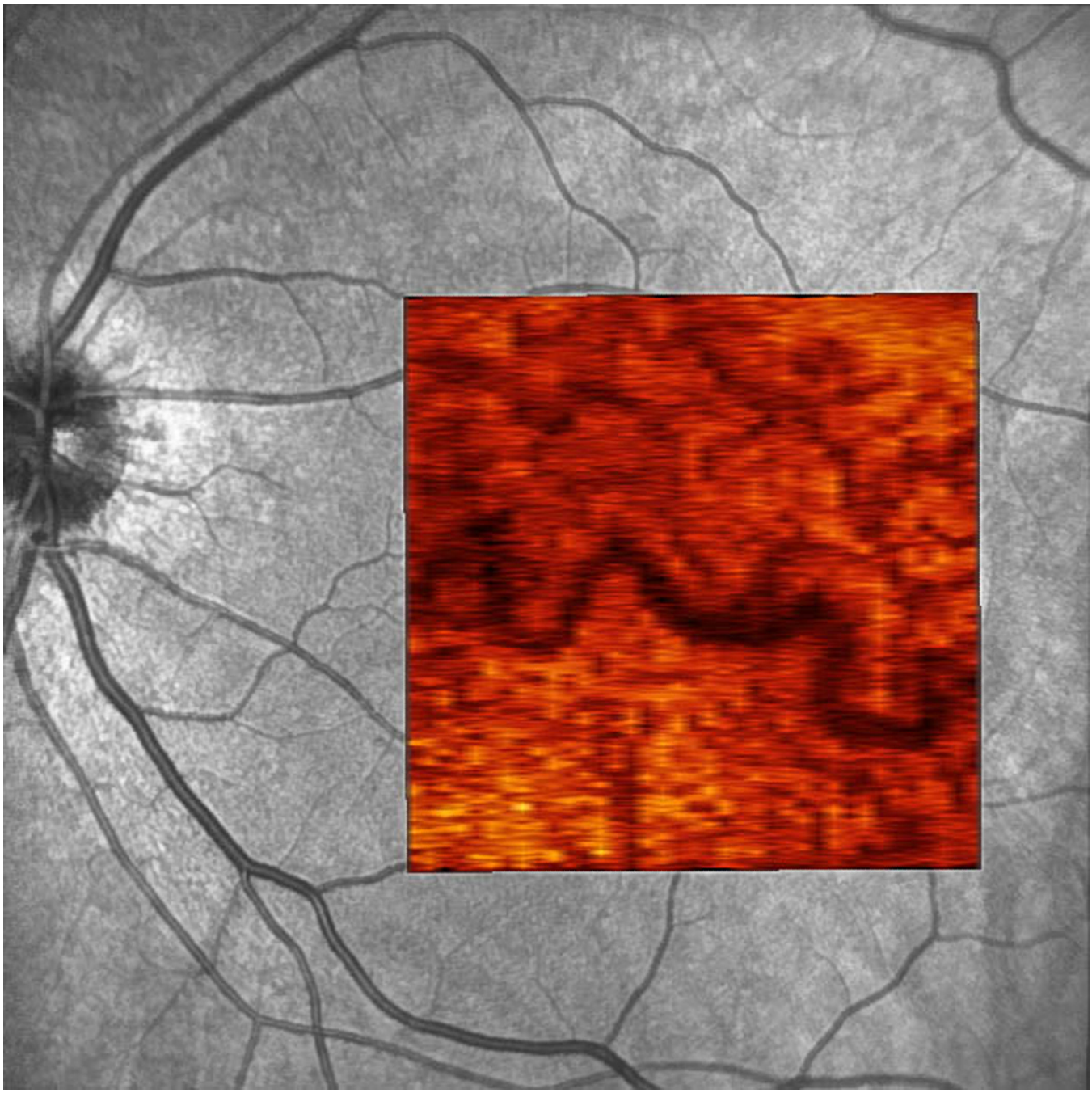

Figure 3.
False-color en face SD-OCT overlayed over near infrared reflectance image of the macula demonstrated the choroidal macrovessel traversing the fovea.