

# Multimodal imaging of multifocal chorioretinitis secondary to endogenous candida infection

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## Abstract

**Purpose** To present multimodal imaging of multifocal chorioretinitis secondary to endogenous candida infection in a young adult.

**Methods** A 49-year-old woman who presented for evaluation of bilateral endogenous candida chorioretinitis underwent complete ophthalmic examination, in addition to fundus photography (FP), enhanced depth imaging optical coherence tomography, fundus autofluorescence (FAF), fluorescein angiography (FA), indocyanine green angiography (ICGA) and optical coherence tomography angiography (OCTA).

**Results** Multimodal imaging of both eyes of the patient affected by endogenous candida chorioretinitis was performed. FP showed multiple white chorioretinal lesions at the posterior pole, FAF showed dark dot at the posterior pole surrounded by hyperautofluorescence area, FA showed early hyperfluorescence round perifoveal lesion at the posterior pole and small hyperfluorescence dots under the inferior retinal vessels. Early ICGA showed hypofluorescence dots at the posterior pole. Late ICGA showed dark hypofluorescence dots at the posterior pole surrounded by faint hyperautofluorescent ring. OCTA showed dark areas corresponded to hypoperfusion areas seen with early ICGA.

**Conclusion** We reported multimodal imaging of an unusual occurrence of multifocal chorioretinitis due to immunosuppression. These findings suggested that the infection resulted from choroidal infiltration via the short posterior ciliary arteries with resultant breakthrough into the retina, rather than via the central retinal artery. By comparing findings on OCTA with data obtained from traditional systems, we are gaining essential information on the pathogenesis of endogenous candida chorioretinitis.

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This study was performed in the Ophthalmology Unit, Sant'Orsola-Malpighi Hospital, University of Bologna, Bologna, Italy.

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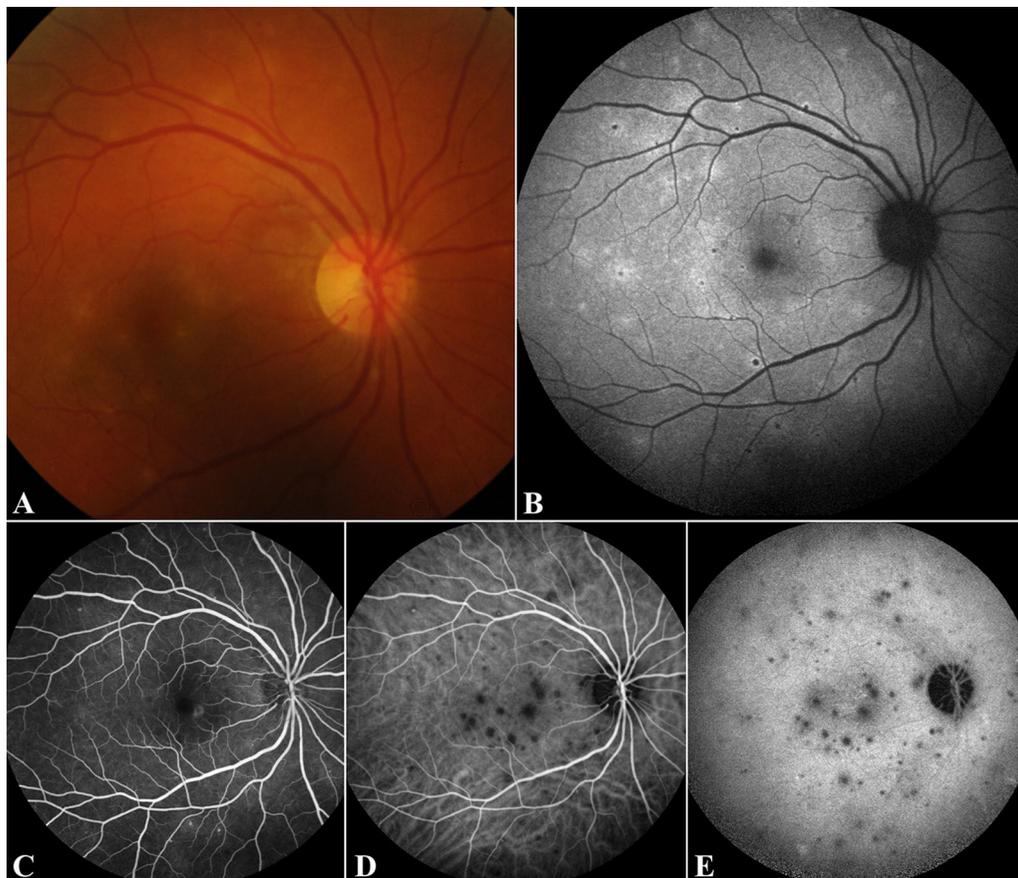
**Keywords** Bilateral endogenous candida chorioretinitis · Multimodal imaging · OCTA

Multimodal imaging of multifocal chorioretinitis secondary to endogenous candida infection is a combination of imaging modalities to provide improved preclinical assessment, diagnostics and therapeutic monitoring.

Multifocal chorioretinitis due to immunosuppression is an unusual occurrence, and early diagnosis and treatment are imperative and may be life-saving [1].

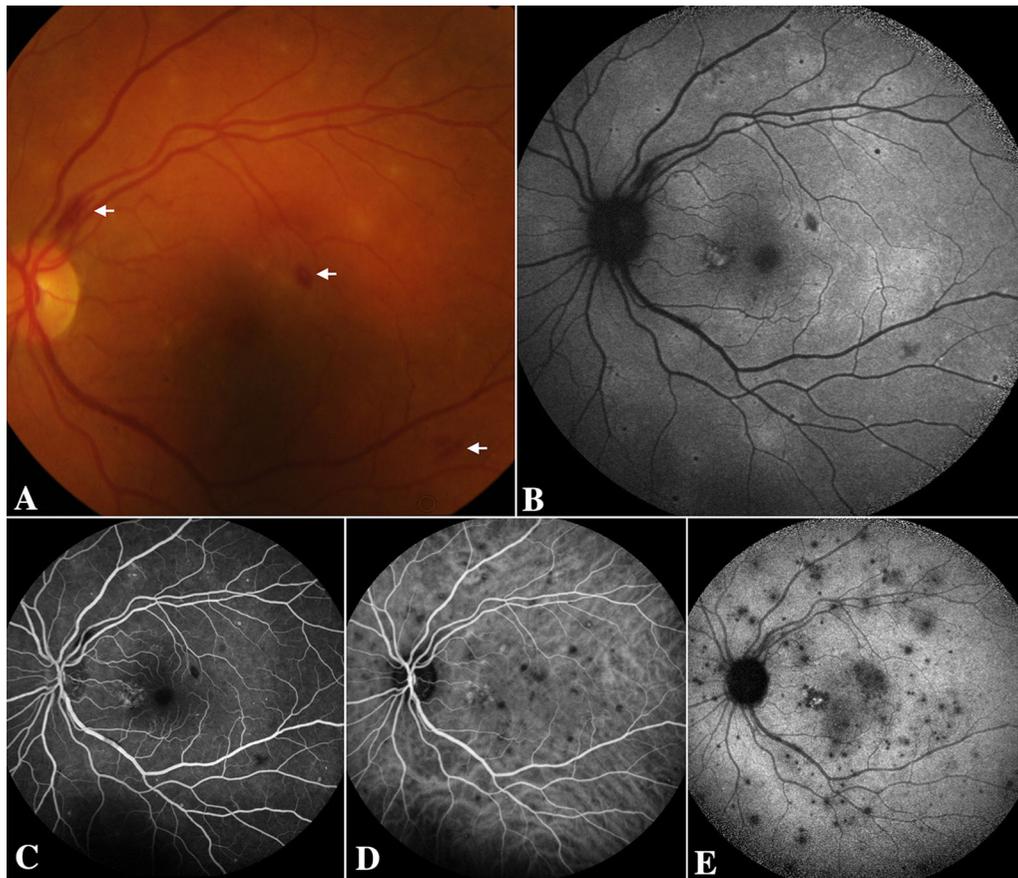
We report a case of endogenous candida chorioretinitis (ECC) [2] in a 49-year-old woman with a history of squamous cell carcinoma of the tongue, treated with radiotherapy. She subsequently required insertion of a catheter for administration of chemotherapy to treat recurrent disease, and she developed later

hematogenous seeding with blood culture positive for *Candida albicans*. Intravenous treatment was initiated with fluconazole (600 mg/daily). At presentation, visual acuity was 20/20 in both eyes with no anterior segment inflammation. Dilated ophthalmoscopic examination demonstrated multiple white chorioretinal lesions in the posterior pole of both eyes without vitreal extension and showed rare hemorrhages with Roth spots in the left eye, presumably septic emboli. The patient was evaluated with multimodal imaging [3, 4]. Stephens et al. [5] described two optical coherence tomography (OCT) patterns of posterior fungal involvement: (1) chorioretinal infiltration and (2) inner retinal vascular infiltration.



**Fig. 1** Multimodal imaging of the right eye of the patient affected by endogenous candida chorioretinitis. **a** Fundus photography (FP) of the right eye showed multiple white chorioretinal lesions at the posterior pole. **b** Fundus autofluorescence (FAF) showed dark dot at the posterior pole surrounded by hyperautofluorescence area. **c** Fluorescein angiography (FA)

showed early hyperfluorescence round perifoveal lesion at the posterior pole and small hyperfluorescence dots under the inferior retinal vessels. **d** Early indocyanine green angiography (ICGA) showed hypofluorescence dots at the posterior pole. **e** Late ICGA showed dark hypofluorescence dots at the posterior pole surrounded by faint hyperautofluorescent ring

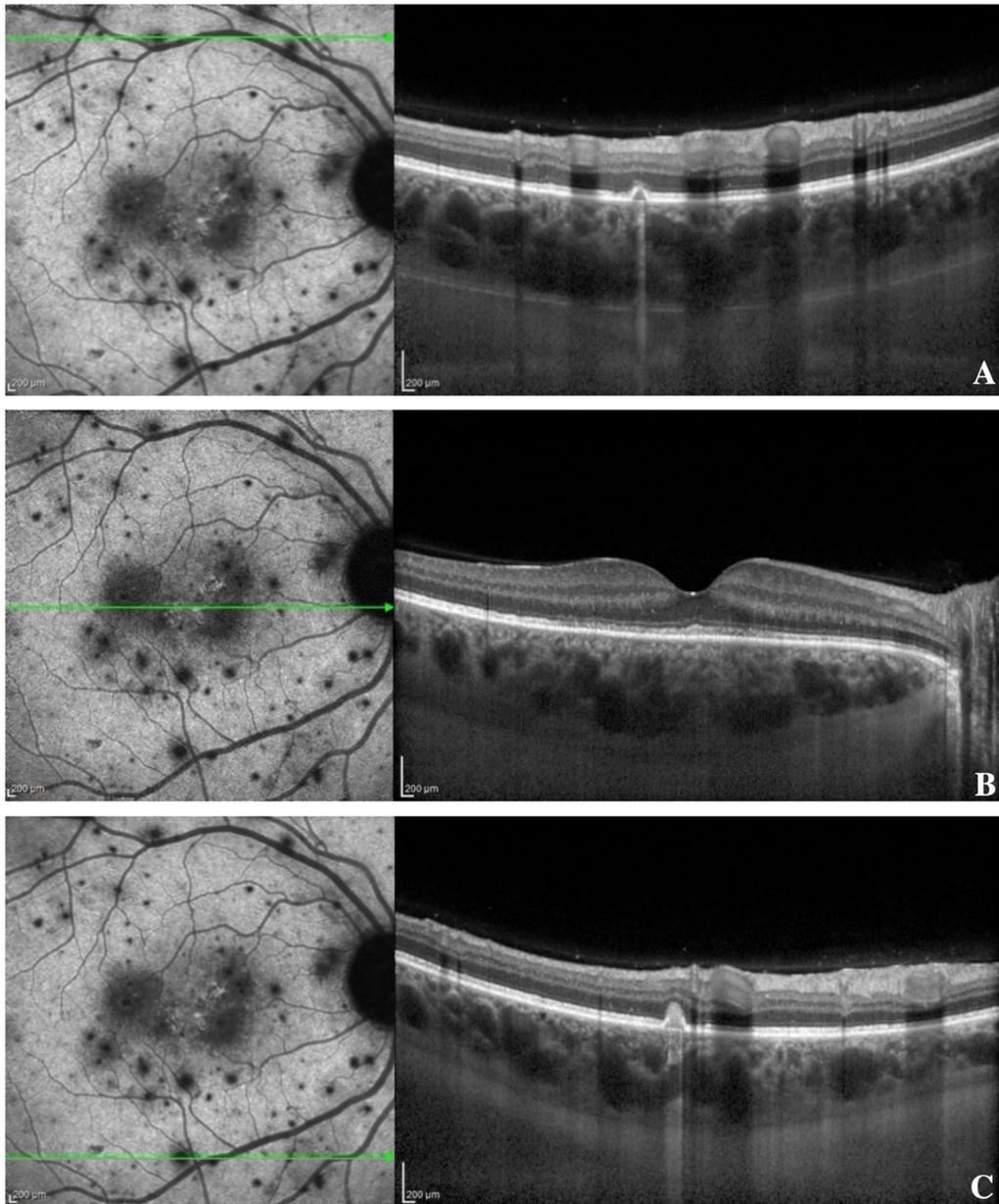


**Fig. 2** Multimodal imaging of the left eye of the patient affected by endogenous candida chorioretinitis. **a** FP of the left eye showed some white chorioretinal lesions and rare hemorrhages with Roth spots (arrow) at the posterior pole. **b** FAF showed dark dot at the posterior pole surrounded by hyperautofluorescence area and hypofluorescence lesions corresponding

to retinal hemorrhages. **c** FA showed small hypofluorescence dots at the posterior pole and hypofluorescence lesions corresponding to retinal hemorrhages. **d** Early ICGA showed hypofluorescence dots at the posterior pole. **e** Late ICGA showed dark hypofluorescence dots at the posterior pole surrounded by faint hyperautofluorescent ring

Previous studies reported images of ECC [1–5]; however, this is the first complete multimodal imaging described in the literature, which also includes indocyanine green angiography (ICGA). Moreover, to the best of our knowledge, we report the first OCTA findings in a patient with unusual multifocal chorioiditis secondary to ECC. Optical coherence tomography angiography (OCTA) showed dark areas corresponded to hypoperfusion areas seen with early ICGA. OCTA may be best employed in a multimodal

approach to interpret changes in the vascular flow due to inflammation and/or infection of the choroid in ECC. These findings suggested that the infection resulted from choroidal infiltration via the short posterior ciliary arteries with resultant breakthrough into the retina, rather than via the central retinal artery. By comparing findings on OCTA with data obtained from traditional systems, we are gaining essential information on the pathogenesis of ECC. Furthermore, the novel point of our photograph essay is the

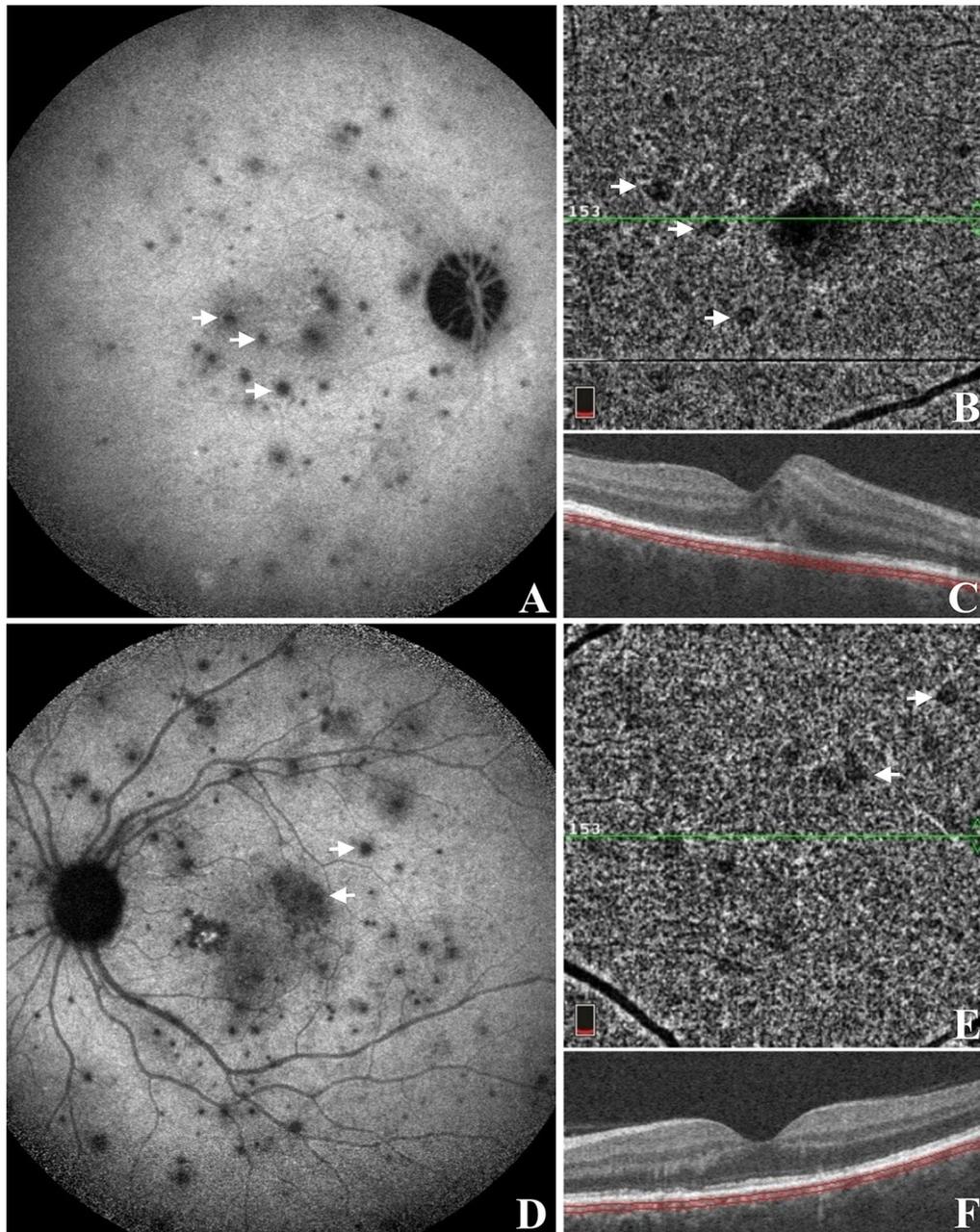


**Fig. 3** Cross-sectional late ICGA and enhanced depth imaging optical coherence tomography (EDI-OCT) images of the right eye showed different chorioretinal patterns. **a** EDI-OCT demonstrating small subretinal pigment epithelium (sub-RPE)

infiltrate **b** EDI-OCT demonstrating rarefaction of inner segment/outer segment (IS/OS). **c** EDI-OCT demonstrating subretinal pigment epithelium (sub-RPE) infiltrate with RPE breakthrough

comparison between a new imaging technique and an old technique that could suggest a future use of OCTA

in the diagnosis and follow-up of endogenous candida chorioretinitis (Figs. 1, 2, 3 and 4).



**Fig. 4** ICGA, OCTA and OCT B-scan images of the both eyes. ICGA image (a) of the right eye showed hypoperfusion areas (arrow) corresponding to dark areas in OCTA (b) (arrow). OCT B-scan (c) demonstrating subfoveal infiltrate. ICGA image (d)

of the left eye showed hypoperfusion areas (arrow) corresponding to dark areas in OCTA (e) (arrow). OCT B-scan (f) demonstrating small subretinal pigment epithelium (sub-RPE) infiltrate

#### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interests.

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