En face enhanced depth imaging optical coherence tomography of polypoidal choroidal vasculopathy

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INTRODUCTION

Polypoidal choroidal vasculopathy (PCV) is an acquired, abnormal choroidal vasculopathy, distinct from more typical choroidal neovascularization.
Fluorescein angiography (FA), indocyanin green angiography (ICGA) and Optical Coherence Tomography findings in PCV have been largely described.
Enhanced depth imaging (EDI)-OCT, has been shown to reliably image the full thickness of the choroid.
A new approach to EDI-OCT imaging, called "*En face OCT*," combines SD-OCT with transverse confocal analysis and produces simultaneous longitudinal (B-scans) and transverse (C-scans) images of the macular area with high pixel-to-pixel correspondence.
Our purpose was to analyze retinal and choroidal changes in polypoidal choroidal vasculopathy using *En face* enhanced EDI - SD-OCT.

METHODS

Thirty consecutive patients presenting with PCV were included in this retrospective and descriptive study at the Centre Hospitalier Intercommunal de Créteil (Créteil, France).

This study was performed in agreement with the French bioethical legislation and in agreement with the Declaration of Helsinki for research involving human subjects. University Paris XII Institutional Review Board approval was obtained for this study. **An informed consent** was obtained from all patients.

For each patient, a **complete ophthalmological examination** was performed, as part of their routine clinical work-up. It included fundus examination, scanning laser ophthalmoscopy (SLO) – FA, SLO-ICGA and EDI-OCT over a 15° x 10° area to encompass the PCV lesion (Heidelberg Spectralis, Heidelberg Engineering, Heidelberg, Germany).
The 3D reconstruction of 197 transverse sections with SD OCT at 30µm intervals, each comprised of nine averaged B-scans, provided a virtual macular brick through which 496 sections in the coronal plane resulted in a C-scan **("*En face*" OCT image)**.
En face imaging (C-scans) were **compared** with indocyanin green angiography (ICGA) images.

Exclusion criteria were any other diagnoses explaining the lesions, high myopia (>8 dioptres), presence of angioid streaks and any previous intraocular therapy. Patients with extreme eye movement or extensive media opacities were also excluded from the study.

RESULTS

Thirty eyes of 30 consecutive patients were studied. In all 30 eyes, ICGA and FA allowed visualization of the PCV.

Polyps were detected **easily** in all cases with *En face* OCT, usually more numerous than with ICGA, as **roundish structures** visible deeper than pigment epithelium layer, and attached to its posterior face, almost always inside a pigment epithelium detachment (PED).

Hyper-reflective dots were visible in most cases with the retinal layers, associated to a well-defined dark area suggesting serous exudation.

The abnormal choroidal network was rarely clearly identified, even when well detected with ICGA.
At the **Bruch membrane level**, polyps were associated to a localized **back shadowing**, and were no more visible at the choriocapillaries layer.

Large choroidal vessels were visible, mainly at the polypoidal lesion periphery, and not directly behind.

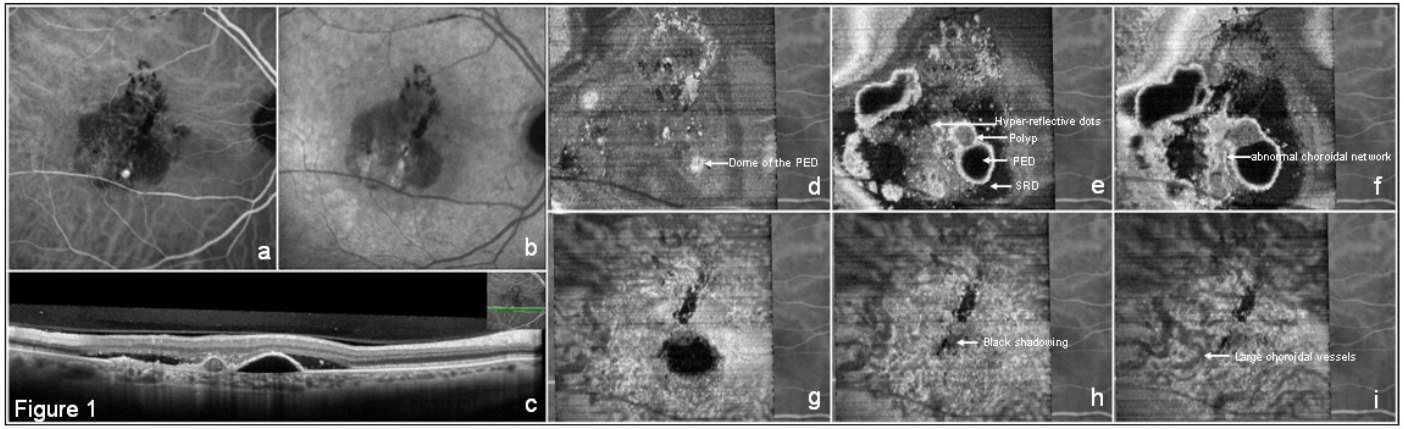

Figure 1.
Early (1a) and late (1b) ICG frames. EDI OCT (1c). "*En face*" OCT imaging: Dome of the PED (1d). Polyps appear as roundish structures deeper than the EP layer and atached to its posterior face, near a dark area suggesting serous retinal detachment (SRD) and associated with hyper-reflective dots (1e). Rarely, the supposed abnormal choroidal network is visible (1f). At the Bruch membrane level, a localized back shadowing is noted (1g,h). Large choroidal vessels are visible mainly in the lesion periphery (1i).

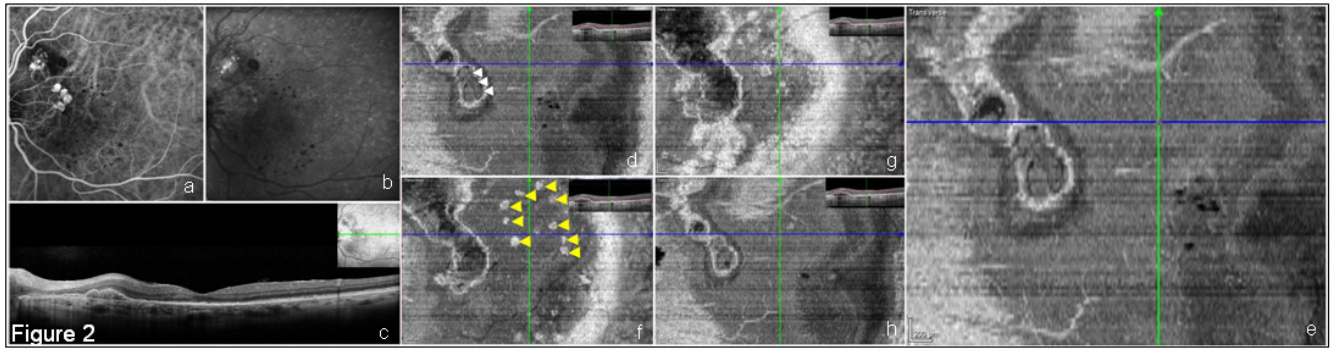

Figure 2.
Early (2a) and late (2b) ICG frames. EDI OCT (2c). "*En face*" OCT imaging: Polyps appear as heterogeneous roundish structures (white arrows) (2d,e,h). Polyps are usually more numerous with *En face* OCT than with ICGA (yellow arrows) (2f,g).

DISCUSSION - CONCLUSION

En face OCT imaging using SD OCT is an easy, **reproducible**, non-invasive and effective tool to visualize and to understand retinal and choroidal changes in PCV.
It provides **complementary morphological information** about the **number** of polyps, their **ultra-structure** and their **activity**, describes new semiological entities and might substitute other exams in the future, without dye injection.

REFERENCES
Yannuzzi LA et *al*. Idiopathic polypoidal choroidal vasculopathy. Retina 1990.
Spaide RF et *al*. Enhanced depth imaging spectral-domain optical coherence tomography. Am J Ophthalmol. 2008.
Podoleanu AG et *al*. Combined multiplanar OCT and confocal scanning ophthalmoscopy. J Biomed Opt. 2004
Coscas F et *al*. En face enhanced depth imaging OCT of fibrovascular PED. Invest Ophthalmol Vis Sci. 2012

* CONFLICT OF INTEREST: NONE