Subretinal pseudocysts: A novel OCT finding in diabetic macular edema

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ABSTRACT
Purpose: to report the presence of a new structural optical coherence tomography (OCT) finding, namely subretinal pseudocysts, in a patient affected by diabetic retinopathy (DR).
Observations: A 52-year-old man affected by type 2 diabetes from 10 years was referred to our department complaining of a visual decline in both eyes. Best corrected visual acuity was 20/100 and 20/80 in the right and left eye, respectively. Fundus examination, fluorescein angiography, and structural OCT revealed the presence of a proliferative DR with diabetic macular edema in both eyes. Interestingly, structural OCT showed subretinal pseudocystic spaces inside the subretinal fluid of the macular neuroretinal detachment.

Conclusions and importance: Subretinal pseudocysts are a new structural OCT entity. We reported for the first time the evidence that pseudocysts may develop in the subretinal space in a case of diabetic macular edema.

1. Introduction
Retinal cystoid spaces were previously described as intraretinal spaces, usually located in the inner nuclear layer and Henle's fiber layer but also in the ganglion cell layer. The anatomic location of cystoid spaces in regard to the Müller cells, if intracellular or extracellular, is still controversy. In this study, we reported the presence of a new structural optical coherence tomography (OCT) finding, namely subretinal pseudocysts, in a patient affected by treatment-naïve proliferative diabetic retinopathy with diabetic macular edema (DME).

The study protocol complied with the tenets of the Declaration of Helsinki. Written informed consent was obtained from the individual participant to publish the collected data, and it was approved by the Local Institutional Review Board (IRB of San Raffaele Hospital, Milan, Italy). In this case, we followed the EQUATOR network CARE guidelines for case reports.

The clinical records of the patient were reviewed, including patients’ demographic data, ocular clinical findings, and structural spectral-domain OCT (Spectralis & HRA; Heidelberg Engineering, Heidelberg, Germany) and Swept-Source OCT-Angiography (OCT-A, PLEX® Elite 9000, Carl Zeiss Meditec Inc., Dublin, CA, USA) examinations.

2. Case report
A 52-year-old man affected by type 2 diabetes from 10 years was referred to our department complaining of a visual decline in both eyes from several months. He was affected by hypertension controlled by medications. He had no other relevant past conditions and/or past ocular impairment. Best corrected visual acuity was 20/100 in the right eye (RE) (refraction +1.50 diopters) and 20/80 in the left eye (LE) (refraction +1.00 diopters). Intraocular pressure was 17 mmHg in both eyes, and he was phakic. The patient was not affected by ruberosis iridis, and the anterior segment evaluation was unremarkable. Fundus examination, fluorescein angiography (FA), and structural OCT revealed the presence of a proliferative DR with DME in both eyes. Interestingly, structural OCT showed the appearance of cystoid spaces inside the subretinal fluid of the macular neuroretinal detachment (Fig. 1A–B). Swept-Source OCT-A demonstrated the presence of weak flow signal inside the pseudocystic space, attributable to a Suspended Scattering Particles in Motion (SSPiM) effect (Fig. 1C). FA revealed no specific finding in the correspondence of subretinal pseudocyst (Fig. 1D).

3. Discussion
The new structural OCT finding here reported, namely “subretinal
Fig. 1. (A) Combined infrared reflectance and structural optical coherence tomography (OCT) B-scans passing through the fovea showing the presence of a cystoid spaces inside the subretinal fluid of the macular neuroretinal detachment of the right eye (red arrows). The subretinal pseudocysts appear surrounded by a hyperreflective edge with a grey material inside (A) and seem to imprint the retinal pigment epithelium (B). (C) OCT-angiography b-scan without and with flow showing the presence of a weak flow signal inside the cystoid space (white arrows), attributable to a Suspended Scattering Particles in Motion (SSPiM) effect. (D) Fluorescein angiography (FA) showing leakage due to the breaking of the blood-retinal barrier, retinal ischemia, microaneurysms and vascular abnormalities; no specific finding was shown by FA in the correspondence of subretinal pseudocyst (white circle). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)
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space and have caused subretinal pseudocysts. On the other hand, we
presented diabetic patient, Müller cells have migrated into the subretinal
blood is usually characterized by a more hyperre
pooling of blood that is compressing the outer nuclear layer, although
that subretinal pseudocyst detected by structural OCT may represent a
by diabetic retinopathy (Fig. 2). For this reason, we could not exclude
segments in the center where the pseudocysts are not present.

pseudocysts”, in a DME patient, suggests that cystoid spaces may de-
develop not only inside the neuroretina but also in the subretinal space.
Whether the cysts are intracellular or extracellular in regard to the
Müller cells is still debated, but it is well known that Müller cells play a
fundamental role in controlling homeostasis of water and ionic con-
centrations in the interstitial area. Edwards et al. has shown that
Müller cells could migrate into the subretinal space in geographic
atrophy and this finding was observed also in retinal detachment. All
these findings support that Müller cells are very mobile when stimu-
lated by a “trauma”. For this reason, we hypothesize that in the pre-
mitted diabetic patient, Müller cells have migrated into the subretinal
space and have caused subretinal pseudocysts. On the other hand, we
disclosed the presence of pooling of blood compressing the outer nu-
clear layer in the histological examination of another patient affected
by diabetic retinopathy (Fig. 2). For this reason, we could not exclude
that subretinal pseudocyst detected by structural OCT may represent a
pooling of blood that is compressing the outer nuclear layer, although
blood is usually characterized by a more hyperreflective appearance at
structural OCT. Similar findings were also detected by our group in a
patient affected by exudative age-related macular degeneration.

4. Conclusions

This case describes for the first time the occurrence of cystoid spaces
inside the subretinal fluid on structural OCT, namely subretinal pseu-
docysts.

Patient consent

The patient provided written informed consent for publication of this
case report and any accompanying images.

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Authorship

All authors attest that they meet the current ICMJE criteria for
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Declaration of competing interest

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