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Brief report

Evaluation of rhegmatogenous retinal detachments using Optos ultrawide field fundus fluorescein angiography and comparison with ETDRS 7 field overlay

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Abstract

Purpose: To evaluate the ultrawide field fundus fluorescein angiography (UWFA) characteristics of rhegmatogenous retinal detachments (RRDs) and compare the findings with an early treatment diabetic retinopathy study (ETDRS) 7 field (ETDRS7F) overlay.
Methods: UWFA (Optos, PLC, Dunfermline, UK) was performed in 10 eyes with macula-off RRDs in 9 patients. The findings of UWFA were compared with that of an overlay of standard ETDRS7F.
Results: Vascular dilation, tortuosity of vessels, and blockage of choroidal fluorescence were noted in all eyes in both UWFA and ETDRS7F overlay. Other findings in UWFA and ETDRS7F included peripheral perivascular staining (10 versus 4 eyes), peripheral capillary nonperfusion (CNP) (9 eyes compared to none), vascular loop formation (7 eyes versus none), optic disc hyperfluorescence (5 eyes in both), petaloid leak at macula (2 eyes in both), and neovascularization elsewhere (3 eyes versus none).
Conclusions: Peripheral perivascular staining and leak, CNP, and vascular tortuosity are common UWFA features of RRDs. Standard ETDRS7F missed peripheral CNP, peripheral vascular loops, and peripheral retinal new vessels in all eyes compared to UWFA in the current study.

Keywords: Capillary nonperfusion; Perivascular leak; Vascular loop; Arteriovenous shunt; Retinal neovascularization; Neovascularization of iris

Introduction

Ultrawide field fundus imaging (Optos PLC, Dunfermline, UK) captures 82% (200°) of retina even through a small pupil, giving a pseudo color fundus image, fluorescein angiogram, and autofluorescence image.[1] Vascular changes associated with rhegmatogenous retinal detachments (RRDs) have been studied by routine fluorescein angiography.[2–5] However, to the best of the authors' knowledge, no previous study explored the angiographic features using Optos single panoramic ultrawide field fundus fluorescein angiogram (UWFA). The authors evaluated the UWFA features of RRDs in this study and compared the findings with the standard early treatment diabetic retinopathy study (ETDRS) 7 field (ETDRS7F) overlay.

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Table 1
Summary of ultrawide field fundus fluorescein angiographic (UWFA) findings noted in our study compared to an overlay of early treatment diabetic retinopathy study 7 field (ETDRS7F).

	Eyes (n = 10) UWFA finding	ETDRS7F features
Blockage of choroidal fluorescence	10	10
Vascular dilatation	10	10
Vascular tortuosity	10	10
Peripheral perivascular stain and leak	10	4
Peripheral Capillary non-perfusion	9	0
Peripheral vascular loop formation	7	0
Optic disc leak	5	5
Petaloid leak at macula	2	2
Neovascularization elsewhere	3	0

UWFA: Ultrawide field fundus fluorescein angiographic, ETDRS7F: Early treatment diabetic retinopathy study 7 field.

Methods

UWFA was performed in 10 eyes of 9 patients with RRD involving the macula. The imaging protocol included single central UWFA along with 4 images with the patient looking up, down, right, and left both in the early and late phase of the fluorescein angiogram. Patients with hypertension, diabetes, and a history of premature birth were excluded. Other exclusion criteria included retinal vascular diseases (retinal vascular occlusions, diabetic retinopathy, vasculitis, familial exudative vitreoretinopathy, carotid occlusive disease), and history of penetrating trauma. The features were evaluated by two experienced retina consultants (R.C. and K.T.) independently and only the features to which both of them agreed upon were included. An overlay of 7 fields (30° each) as per the standard ETDRS protocol/Modified Airlie house classification used by the diabetic retinopathy study[6] was superimposed on the UWFA using Microsoft® PowerPoint. The findings visible within the area of this ETDRS7F were then compared with UWFA. The tenets of the Declaration of Helsinki were followed throughout patient care. UWFA was performed after written informed consent. No adverse reaction to fluorescein dye was noted although 3 patients complained of nausea at the time of the procedure.

Results

A total of 10 eyes of 9 patients (3 males and 6 females) were studied. The age ranged from 15 to 60 years, with mean (±standard deviation, SD) 30.22 (±17.1) years and a median of 23 years. The mean (±SD) duration of symptoms was 13.6 (±16) weeks with a median of 10 weeks (range, 1–52 weeks). On UWFA and ETDRS7F, blockage of choroidal fluorescence and dilated/tortuous vessels were noted in all eyes at the area of RRDs (Table 1). UWFA revealed some amount of peripheral perivascular stain and leak (Fig. 1-triangle) in all eyes, while it was noted in 4 eyes with ETDRS7F. Peripheral capillary nonperfusion (CNP) was noted in all eyes with

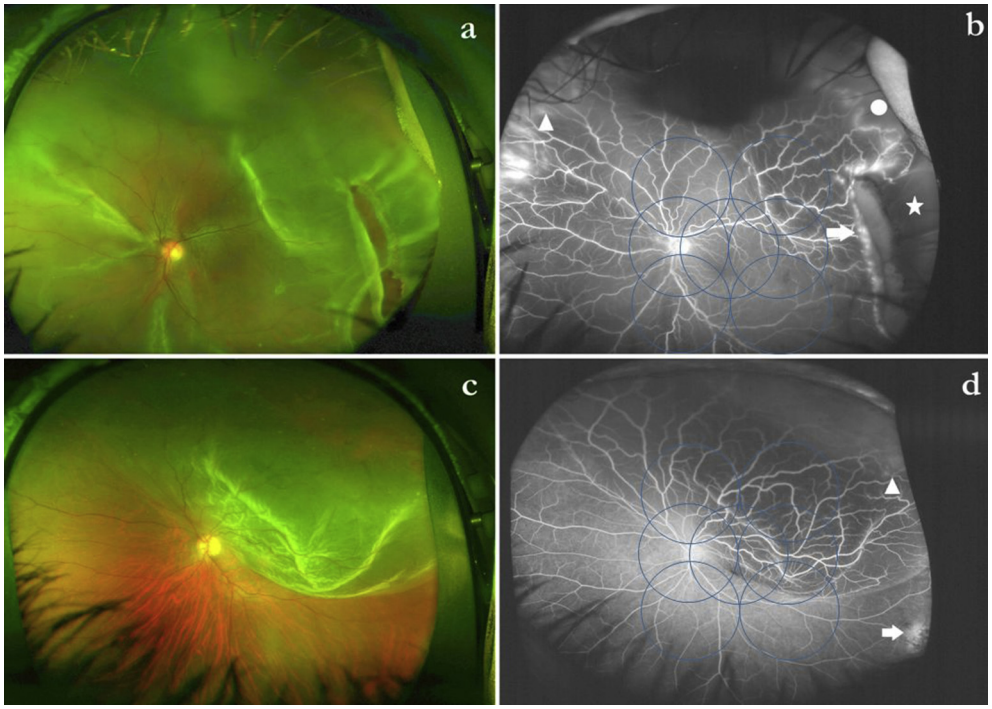

Fig. 1. a – Eye 2 presented with a total rhegmatogenous retinal detachment (RRD) with a large temporal break at the posterior edge of a lattice with vitreoretinal traction. b – Ultrawide field fluorescein angiogram [with early treatment diabetic retinopathy study 7 field (ETDRS7F) overlay] of eye 2 shows retinal capillary nonperfusion (CNP) (round dot) and multiple pinpoint leaks at the posterior edge of the large retinal break showed corresponding to ruptured retinal vessels (arrow). There was no dye transit to the anterior flap (star). c – Eye 3 had a fresh superotemporal retinal detachment. d – Ultrawide field fundus fluorescein angiography (UWFA) (with ETDRS7F overlay) demonstrated mild perivascular stain and leak (triangle) with no obvious peripheral CNP. Inferotemporal lattice caused window defects (arrow).