Optical coherence tomography angiography features of retinitis post-rickettsial fever

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The intraocular manifestations of rickettisial retinitis include retinal vasculitis, maculopathy, optic neuritis, and neurosensory detachment. Extensive leakage of dye on the fundus fluorescein angiography may obscure visualization in eyes with retinitis. We report the vascular changes in eyes with rickettsial retinitis and its response to treatment using optical coherence tomography angiography. The microvascular abnormalities we noted were, capillary drop out areas corresponding to retinitis patches, vascular loops, and pruning of vessels. The choriocapillary slabs showed signal void areas. Post-treatment there was vascular remodeling with decrease in non-perfused area, appearance of new vascular lateral branching, and appearance of collaterals.

Key words: Angiography, fever, microvasculature, Optical coherence tomography angiography, retinitis, rickettsia

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The intraocular manifestations of rickettisial retinitis include retinal vasculitis, maculopathy, optic neuritis, and neurosensory detachment.[1–4] The vascular architecture in eyes with post-fever retinitis has been studied using the fundus fluorescein angiography (FFA).[1,2] Extensive leakage of dye on FFA may obscure visualization of microvasculature in eyes with retinitis. Optical coherence tomography angiography (OCTA) is a dyeless, non-invasive tool to assess the microvasculature of the eye.[5] We report vascular changes in eyes with rickettsial retinitis and its response to treatment using OCTA.

Case Report

A 17-year-old male presented with diminished vision in both eyes since 10 days. He had an episode of fever 2 weeks before the onset of symptoms. On examination, his best-corrected visual acuity (BCVA) was 6/36 in right eye and 1/60 in left eye. Anterior segment examination in both eyes was unremarkable. Fundus examination in the right eye revealed soft exudates and hemorrhage suggestive of retinitis [Fig. 1a]. Right eye optical coherence tomography (OCT) showed vitreous cells and neurosensory detachment (NSD) at fovea [Fig. 1b]. Right eye OCTA showed distortion of the foveal avascular zone (FAZ) with capillary non-perfusion (CNP) areas in superficial capillary plexus (SCP) and deep capillary plexus (DCP) [Fig. 1c and d]. Choriocapillary layer in the right eye showed signal void areas corresponding to soft exudates [Fig. 1e]. Left eye fundus examination revealed retinal whitening and retinal hemorrhages [Fig. 2a]. Left eye OCT showed vitreous cells and NSD at fovea [Fig. 2b]. In the left eye, SCP and DCP showed multiple CNP areas, pruning of vessels temporal to the disc, and signal void areas [Fig. 2c and d]. Choriocapillary slab in the left eye showed absence of signals at areas corresponding to soft exudates [Fig. 2e]. Patient was investigated for chikungunya, dengue, typhoid, and rickettsia and was found positive for OX-2 antigen and negative for OX-K and OX-19. He was started

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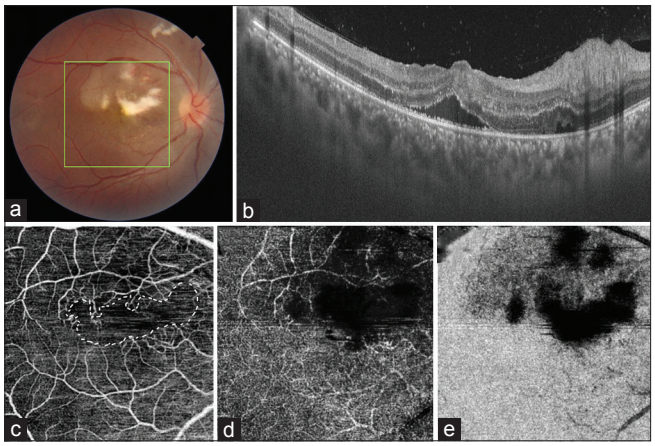

Figure 1: (a) Right eye showing soft exudate at macula with whitening of retina and hemorrhages. (b) Swept-source optical coherence tomography (SS-OCT) showing vitreous cells, thickening of the nerve fiber layer with neurosensory detachment at fovea. (c) Optical coherence tomography angiography (OCTA) 6 × 6 mm slab of superficial capillary plexus showing distortion of the foveal avascular zone with capillary drop out areas superior to the fovea (white-dotted line). Pruning of the vessel was noted at the macula. (d) Deep capillary plexus showing projection artifacts with capillary drop out areas at macula. (e) Choriocapillary slab in the right eye showed projection artifacts with signal void areas

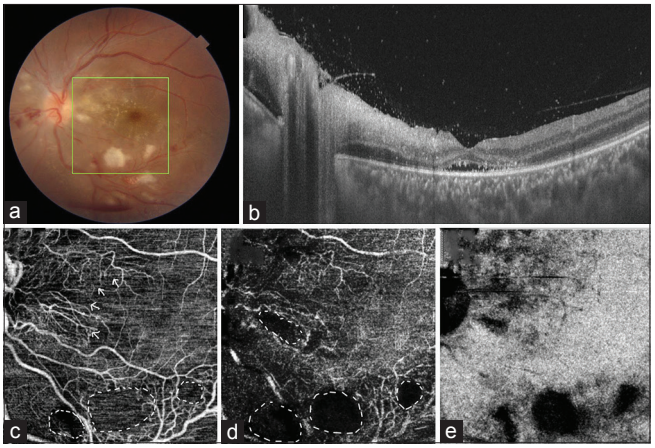

Figure 2: (a) Left eye showing multiple soft exudates and retinal hemorrhage. (b) Swept-source optical coherence tomography (SS-OCT) showing vitreous cells, thickening of the nerve fiber layer with neurosensory detachment at fovea. (c) Optical coherence tomography angiography (OCTA) at superficial capillary plexus showed multiple capillary drop out areas, pruning of vessels temporal to the disc (white arrows), capillary drop out corresponding to soft exudates (white-dotted lines). (d) OCTA at deep capillary plexus showing projection artifacts and capillary drop out corresponding to soft exudates (white-dotted lines). (e) OCTA choriocapillary slab in the left eye showing signal void areas

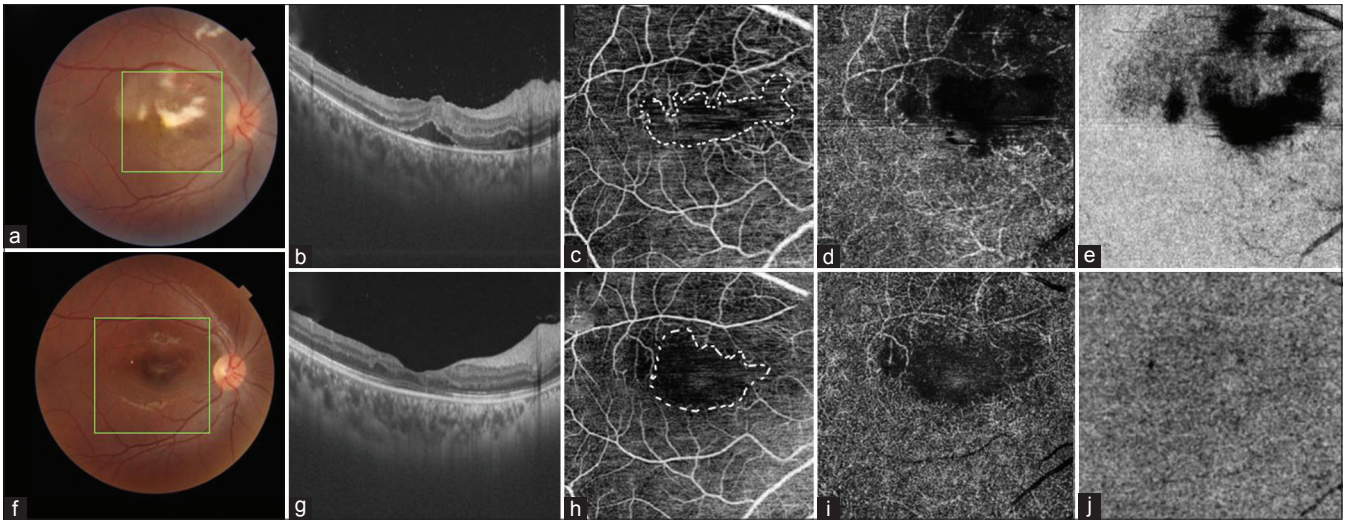

Figure 3: (a) Right eye color photograph at presentation. (b) Optical coherence tomography (OCT) of the right eye at presentation. (c-e) Optical coherence tomography angiography (OCTA) at superficial capillary plexus (SCP), deep capillary plexus (DCP), and choriocapillary at presentation. (f) At 6 months showing complete resolution of soft exudates and hemorrhages. (g) OCT showed absence of neurosensory detachment. (h) OCTA 9 × 9 mm at 6 months, SCP demonstrating enlarged FAZ (white line) and reorganization of the capillary network. (i) OCTA at DCP showed enlarged FAZ with decrease in CNP area. (j) Choriocapillary slab showed normal choroidal vasculature

on oral doxycycline and oral prednisolone. At 1 month he had BCVA of 6/18 and 3/60 in the right and left eye, respectively. At 6 months follow-up BCVA was 6/9 in the right eye and 6/12 in the left eye. Complete resolution of soft exudates and hemorrhages was noted in both eyes [Figs. 3 and 4]. Both eyes OCT showed absence of vitreous cells and NSD [Figs. 3g and 4g]. In the right eye, SCP and DCP showed enlarged FAZ, reduction in the CNP area, and reorganization of the capillary network [Fig. 3h and i]. In the left eye, SCP showed reorganization of capillary network at macula, with decrease in CNP area and disappearance of abnormal vessels temporal to the disc [Fig. 4h]. Left eye DCP showed decrease in CNP area with minimal distortion of FAZ [Fig. 4i]. Choroicapillaries in both eyes were normal [Fig. 3j and 4j].

Discussion

The vascular changes in post-fever retinitis has been studied using FFA.[1,2] Kawali *et al*. reported FFA features in rickettsial retinitis. They noted that in early phase there was hypofluorescence corresponding to the retinitis patch and in late phase there was hyperfluorescence at the margin,

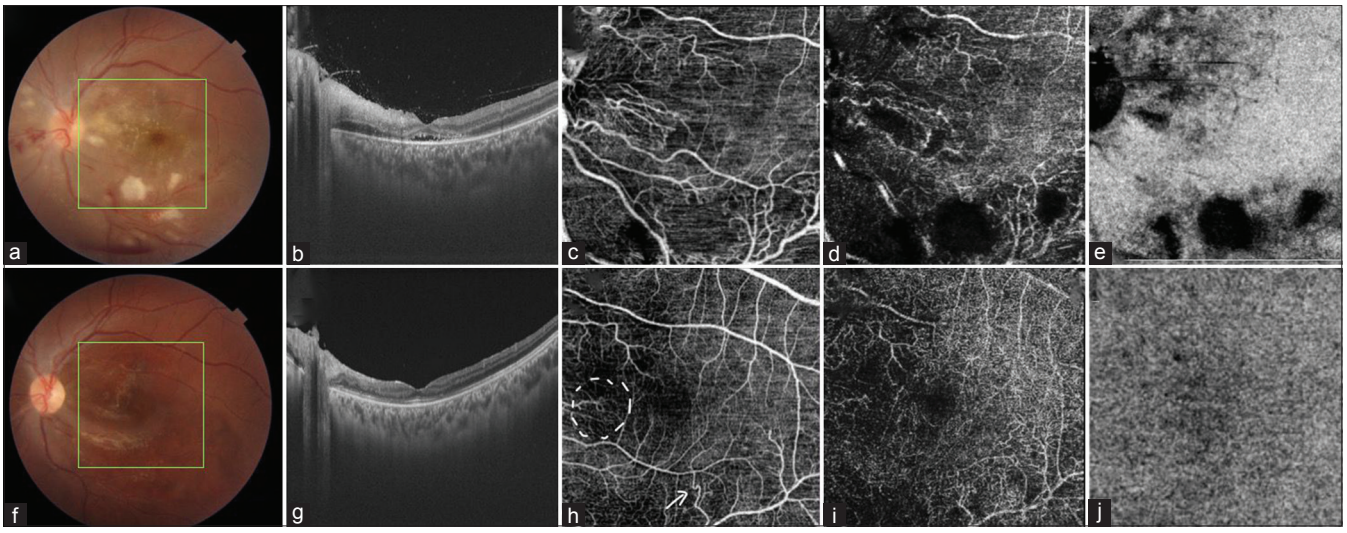

Figure 4: (a) Left eye at presentation. (b) Swept-source optical coherence tomography (SS-OCT) at presentation. (c–e) Optical coherence tomography angiography (OCTA) at superficial capillary plexus (SCP), deep capillary plexus (DCP), and choriocapillary at presentation. (f) At 6 months showing resolution of soft exudates and hemorrhages. (g) Optical coherence tomography (OCT) showing absence of neurosensory detachment. (h) At 6 months OCTA 9 × 9 mm at level of SCP showing vascularization of capillary drop out areas and disappearance of abnormal vessels (white-dotted line). (i) OCTA at DCP showing projection artifacts with decrease in CNP area with minimal distortion of FAZ. (j) Choriocapillary slab showed normal choroidal vasculature

staining of the vessel, and leakage.[2] Khairallah *et al.* studied FFA features of 60 eyes with rickettsial retinitis. They reported that vascular leakage (45%), staining of the disc (50%), hypofluorescent choroidal dots (16.7%), and delayed filling of branch retinal vein (1.7%).[1]

Advantages of OCTA like, being dyeless and the ability to visualize retinal and choroidal vasculature layer-wise helps us understand microvascular changes in the area of retinitis which was not possible with FFA due to vascular leakage.[5]

Microvascular abnormalities we noted were, CNP areas corresponding to retinitis patches and pruning of vessels. Deep capillary plexus showed profound capillary non-perfusion when compared to the superficial plexus. The choriocapillary slabs showed signal void areas which can be attributed to shadowing caused due to overlying retinitis patch.

Changes in OCTA in the SCP and DCP were noted in dengue and chikungunya retinitis.[6-8] Agarwal *et al.* in their report on OCTA features of chikungunya retinitis reported that there were flow void areas in SCP, DCP, and choriocapillary slabs.[6] Aggarwal *et al.* in their report on OCTA features of acute macular neuroretinopathy post-dengue fever noted flow deficit areas in SCP and DCP. They did not report any changes at the level of choriocapillary.[7] Bajgai *et al.* noted broken foveal avascular zone in only SCP of OCTA in a case of dengue maculopathy and these changes persisted at follow-up visits.[8]

So far in the literature there is only one report of OCTA features of rickettsial retinitis by Kahloun *et al.*[9] They described hypointense dark areas in SCP and DCP, more so in deeper plexus. Similar features were noted in our case at presentation. Post-treatment with prednisolone and doxycycline, Kahloun *et al.* observed that the hypointense area persisted.[9]

In our case, post-treatment there was vascular remodeling with decrease in non-perfused area and appearance of new vascular lateral branching. At presentation the left eye appeared to have worse prognosis, but the final visual outcome at 6 months was almost close to the right eye. This can be attributed to the vascular remodeling at the macula in the left eye after treatment. Hence the extent of vascular remodeling determines the visual prognosis after treatment and OCTA is a useful tool in these cases to understand the response to treatment.

Limitation of OCTA is that its interpretation can be challenging in presence of projection and motion artifacts.

Conclusion

OCTA can be vital non-invasive tool in understanding the vascular changes in eyes with rickettsial retinitis and help us prognosticate.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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