Three-years follow-up swept source optical coherence tomography angiography findings in post-fever retinitis

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Post fever retinitis (PFR), characterized by multiple cotton wool spot like lesions in the posterior pole, is commonly reported following viral and bacterial infections. Retinal perfusion defects have been documented with the help of optical coherence tomography angiography (OCTA) in cases of PFR. But long term changes in such cases have not been reported earlier. In the following report, we have described the swept-source OCTA findings of two PFR patients at initial presentation and three

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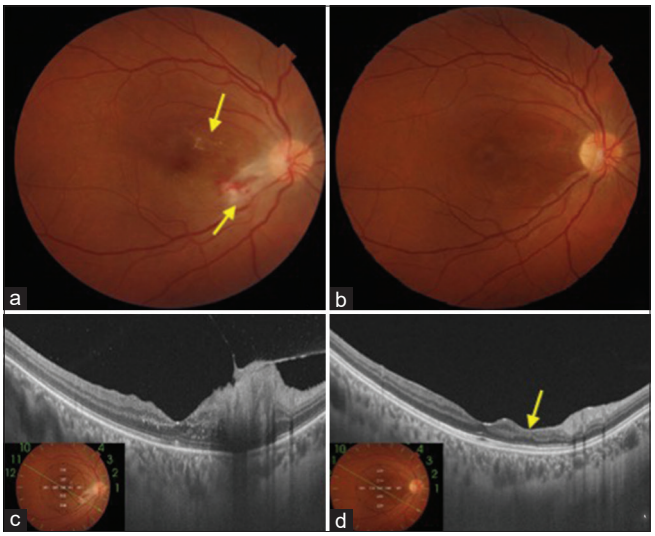

Figure 1: (a) Fundus photo at initial presentation of case 1 showing whitish retinal patches due to post fever retinitis along the infero-temporal arcade (arrow) with presence of subtle hard exudates near the fovea (arrow). (b) At 3 years follow up, the fundus showed no clear cut evidence of any previous retinitis patches. (c) Swept source optical coherence tomography at initial visit showing inner retinal thickening and corrugations (d) At 3 years follow-up, superficial retinal thinning is evident

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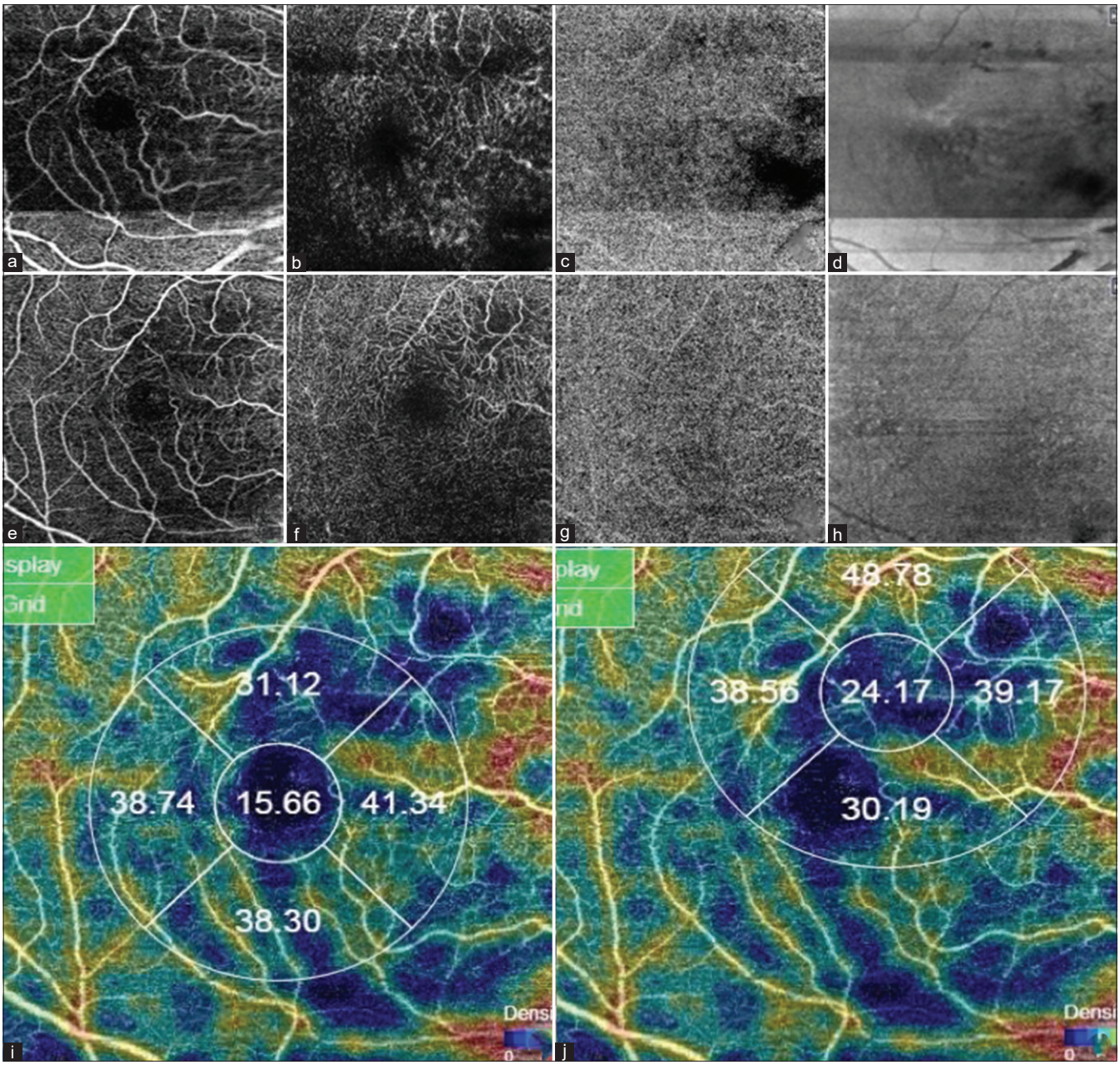

Figure 2: Optical coherence tomography angiography (OCTA) and enface OCT images of case 1:(a-d) Initial visit: Vascular changes noted at (a) superficial retina, (b) deep retinal and (c) choriocapillary level. The dark areas are mostly due to motion and projection artefacts as seen on (d) the outer retinal enface OCT. At 3 years follow-up: perfusion defectscan be noted at (e) superficial, and (f) deep retinal level, with preservation of the (g) choriocapillaris. (h) shows enface OCT section. (i and j) Follow-up OCTA superficial retinal vascular density maps showing reduced scores

years follow-up. Initial OCTA scans may not provide accurate information regarding the perfusion status due to associated retinal edema and inflammation. However, persisting perfusion defects at the superficial and deep retinal capillary plexus were noted on long term follow-up in both the cases.

Key words: Optical coherence tomography angiography, post fever retinitis, retinal perfusion

Cases of postfever retinitis (PFR) have been reported following viral and bacterial infections such as Dengue, Chikungunya, West Nile fever, Lyme's disease, Rickettsial fever, Typhoid and Cat scratch disease.[1,2] The pathogenesis is believed to be immune-mediated or by direct pathogen invasion, leading to occlusive retinal vasculitis and focal retinitis causing vision loss depending on the extent of involvement.[1,2] Optical coherence tomography angiography (OCTA) is a useful non-invasive tool to characterize the perfusion status in both retinal and choroidal layers.[3] Compromise of retinal vasculature in PFR has been reported earlier with the help of OCTA.[4-8] But long term findings on OCTA in cases of PFR have not been documented before. In the following report, we have described the swept-source OCTA (SSOCTA) findings at presentation and on three years follow up of two patients of PFR.

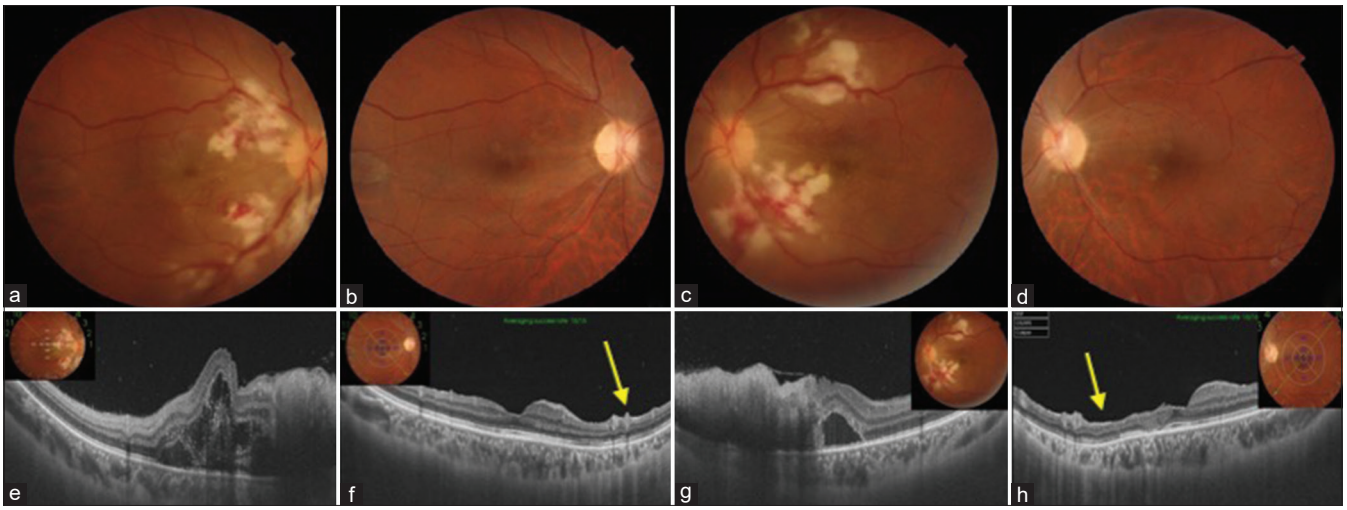

Figure 3: (a and c) Fundus photo at initial presentation of case 2 showing whitish retinal patches due to post fever retinitis along the vascular arcades with associated hemorrhages. (b and d) At 3 years follow-up, the fundus showed subtle retinal whitening and disc pallor in both eyes. (e and g) Swept source optical coherence tomography at initial visit showing inner retinal corrugations with macular edema and neurosensory detachment (f and h) At 3 years follow-up, inner retinal thinning is visible along the affected areas

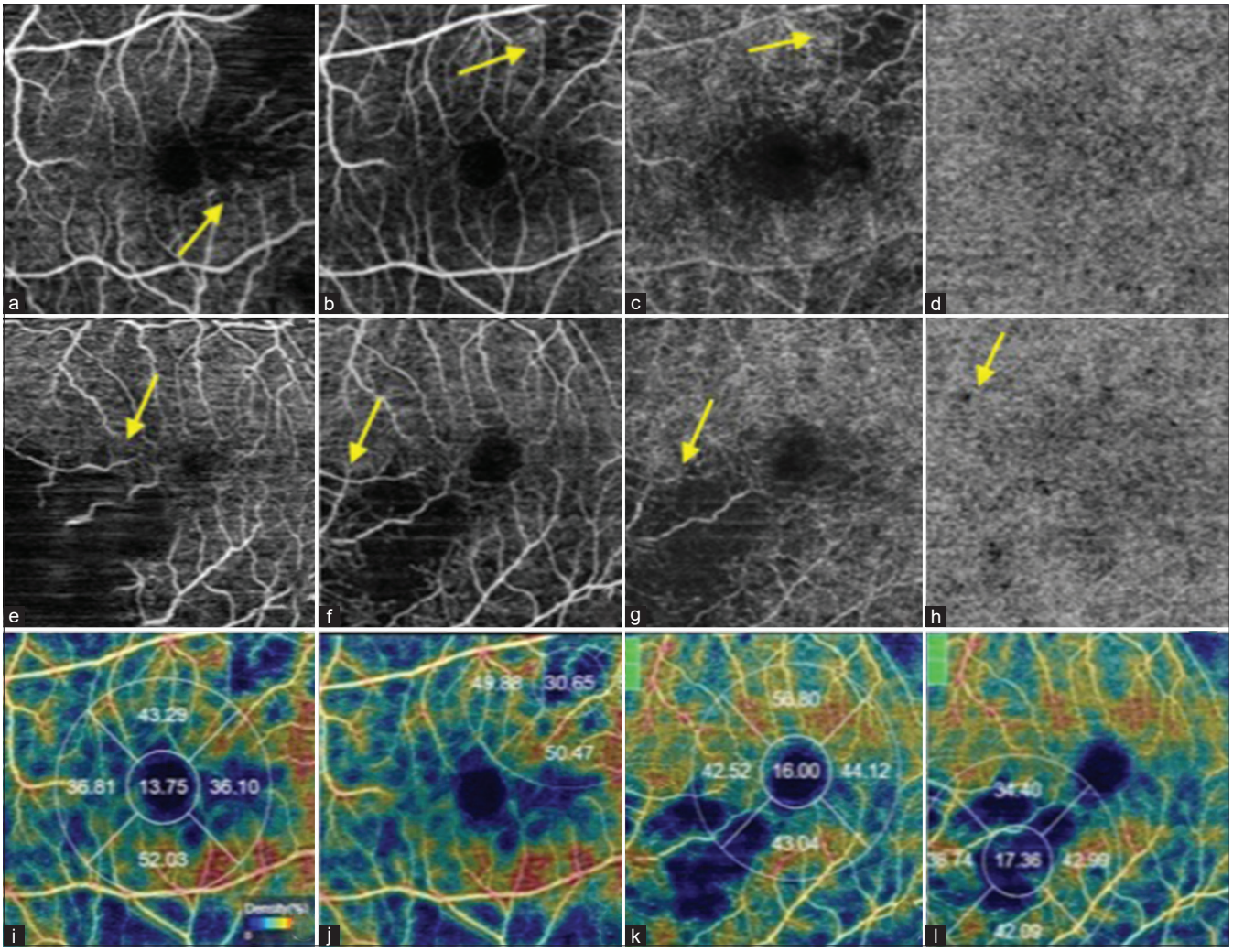

Figure 4: OCTA of case 2: (a and e) Initial OCTA of the superficial retinal capillary plexus of the RE and left eye LE showing dark areas. (b-d) Follow-up OCTA of the RE showed perfusion defects in the superficial (b) and deep (c) capillary plexus. Choriocapillaries were preserved (d). (f-h) Follow up OCTA of the LE showing vascular deficiency at the retinal level (f and g) with choriocapillary flow-voids (h). (i-l) Follow-up Retinal vascular density maps showing reduced density scores in the right eye (i and j) and the left eye (k and l)

Case Reports

Case 1

A 32-year-old female was presented with blurring of vision in her right eye (RE) for 1 month. She had a history of febrile illness with rashes 6 weeks before the onset of ocular symptoms. Her best-corrected visual acuity (BCVA) in the RE was 20/200 and in the left eye (LE) was 20/20. Fundus examination showed focal whitish patches with overlying hemorrhage and surrounding hard exudates along the inferotemporal arcade [Fig. 1a]. Serology tests for Dengue, Rickettsia, Lyme's disease, Bartonella, chikungunya, Human immune-deficiency virus and cytomegalovirus were negative. She was diagnosed to have PFR and was treated empirically with a course of oral Doxycycline for 6 weeks along with tapering dose of oral steroids for two months. She showed clinical improvement [Fig. 1b] over the course of treatment with BCVA RE at three months follow-up of 20/30 with subtle metamorphopsia, which was maintained at three years.

At presentation, SSOCT showed vitreous cells, inner retinal thickening, outer layer hyper-reflectivity with preservation of ellipsoid zone [Fig. 1c]. SSOCTA showed dark areas with blurred vascular architecture in the superficial and deep retinal layers with altered retinal vasculature, probably due to poor flow and retinal edema. Dark patches were visible at the chorio-capillary level also due to shadowing caused by overlying retinitis lesion [Fig. 2a-d].

At three-year follow-up, SSOCT showed thinning of the inner retinal layers corresponding to the previous retinitis lesions [Fig. 1d]. SSOCTA revealed reduced density of vascular network with blunt ending vessels at both the superficial and deep retinal scans [Fig. 2e and f]. The chorio-capillaries were relatively preserved [Fig. 2g]. No shadowing was visible on the enface OCT [Fig. 2h] The OCTA vascular density map showed reduced vascular density scores in the affected eye [Fig. 2i and j] when compared to the normal LE.

Case 2

A 41-year-old male presented with reduced vision in both eyes with BCVA RE—20/80 and LE—finger counter close to face. He had history of fever with rashes one month before. Serology was inconclusive. Both eyes Fundus showed diffuse whitish patches along both the temporal vascular arcades associated with retinal hemorrhages with macular exudation [Fig. 3a and c]. He was diagnosed to have PFR and was managed similar to case 1. At three year follow-up his BCVA RE and LE were 20/40 and 20/80, respectively. Fundus showed optic disc pallor with subtle whitish retinal changes along the arcades [Fig. 3b and d].

At presentation, SSOCT showed changes similar to case one in both eyes [Fig. 3e and g]. SSOCTA both eyes showed patchy dark areas on superficial retinal levels due to the retinal edema. It was difficult to comment on the flow in the retinal blood vessels [Fig. 4a and e]. At three-years follow-up, SSOCT again revealed thinning of inner retinal layer "in both eyes" with a patch of focal loss of ellipsoid zone in the left eye [Fig. 3f and h]. SSOCTA revealed focal areas of reduced vascular density with blunt ending vessels in both the superficial and deep retinal plexus. The deep retinal foveal avascular zone was also disrupted in both eyes more markedly in the LE. Few flow void areas at the chorio-capillary level were also visible [Fig. 4b-d and f-h]. Reduced vascular density scores were more marked in the LE than in the RE [Fig. 4i-l].

Discussion

Kalhoun *et al*.[4] were the first to describe loss of vascularity in the superficial and the deep retinal plexus with the help of OCTA in cases of retinitis post rickettsia fever. Clearly demarcated capillary non perfusion areas were visible at 6 weeks after the resolution of primary retinitis. Other authors have also described retinal perfusion defects with the help of OCTA in cases of PFR such as dengue maculopathy[5-7] and chikungunya retinitis.[8]Our OCTA guided evaluation of two patients who presented with PFR, demonstrated persistence of nonperfusion areas even at three years follow-up.

In all the three eyes in our case series, significant information regarding exact extent of capillary non perfusion could not be derived with the help of initial OCTA scans as the visible dark areas were due to a combination of shadowing caused by retinal edema and actual non perfusion. Shanmugam *et al*.[9] and Kalhoun *et al*.,[4] also showed that it is difficult to discern the perfusion status in the initial OCTA scans due to acute inflammation.

The three years follow-up scans of our patients revealed inner retinal thinning with areas of nonperfusion in the superficial and deep plexus. The presence of a larger area of capillary nonperfusion in the left eye of case 2 could be related to the initial severity of the disease itself being more in this eye. The lack of recovery of vision in this eye as compared with the other eyes may thus corroborate to the persistence of nonperfusion and subtle distortion of FAZ. It is difficult to ascertain the cause of the few focal areas of choriocapillary loss persisting in the 3 year scans.

Conclusion

To conclude, in cases of PFR, the perfusion defects seen on OCTA scans following resolution of retinal edema may correlate with final visual recovery. Larger series with such long term follow up may provide a better insight into this.

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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