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Case Report Open Access

Bartonella Neuroretinitis: A Case Report with New Insights from Fundus Autofluorescence Imaging

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Abstract

Purpose: Fundus autofluorescence (FAF) is a modern functional imaging modality utilized to characterize abnormalities of the retinal pigment epithelium (RPE). There are no prior studies demonstrating FAF findings in both symptomatic and asymptomatic eyes of patients diagnosed with *Bartonella* neuroretinitis.

Methods: Case report and review of the literature.

Patients: Single patient case study.

Results: In the symptomatic right eye, (FAF-Heidelberg Retina Angiograph; Heidelberg Engineering, Heidelberg, Germany) identified abnormality of the RPE which corresponded to pathology seen on fundus photography, fluorescein angiography (FA-Heidelberg Retina Angiograph; Heidelberg Engineering, Heidelberg, Germany) and spectral domain optical coherence tomography (SD-OCT-Spectralis®, Heidelberg Engineering, Heidelberg, Germany). Interestingly, FAF also demonstrated sub-clinical anatomic abnormalities not seen clinically nor detected as clearly by any other imaging modalities in the patient's asymptomatic left eye. As the patient improved clinically, normalization of the FAF occurred in both eyes.

Discussion: This report is the first study to describe novel subclinical and clinical FAF findings as part of the evaluation of a patient with infectious neuroretinitis. Compared to FA, SD-OCT and clinical examination, FAF provided a more detailed functional understanding of this condition in its early stages and was also used to follow the clinical course of this patient. This functional imaging modality confirmed normalization of anatomic abnormalities also demonstrated by the other techniques.

Keywords: *Bartonella*; Neuroretinitis; Autofluorescence

Introduction

Bartonella species are facultative intracellular Gram negative bacilli that target erythrocytes or endothelial cells producing bartonellosis [1]. Upwards of 10-15% of affected patients can develop ocular manifestations which can include Parinaud oculoglandular syndrome as well as neuroretintis, a condition comprised of optic nerve and macular edema and retinal exudates [2].

We present a case of a 26 year-old male who presented with neuroretinitis. FA, SD-OCT, and FAF were used to characterize the clinical course of this patient. FAF was used to localize the focus of pathology and highlighted previously uncharacterized anatomic changes in this condition.

Case Report

A 26 year old myopic male developed flu like symptoms and a blurry spot in the right eye. Medical history was significant for psoriasis and asthma, for which he used topical and inhaled steroids, respectively. The patient worked as a window washer and owned cats. He denied chills, weight loss, recent travel, or new sexual partners.

Examination showed acuity of 20/200 in the right eye and 20/20 in the left eye. Pupillary responses were normal without afferent pupillary defects and intraocular pressure measured 12 mmHg in each eye. Anterior segment examinations were normal without conjunctival injection or anterior chamber inflammation. Dilated fundus examinations revealed clear vitreous with disc edema in both eyes. There was a radial pattern of exudates in the symptomatic right eye (Figure 1) and no exudates in the asymptomatic left eye (Figure 2).

Ancillary testing revealed significant optic disc hyperfluorescence without macular leakage on FA of the right eye (Figure 3) and less extensive optic disc hyperfluorescence without macular leakage in the left eye (Figure 4). SD-OCT demonstrated hyper-reflective deposits in the outer retina with hypo-reflective subretinal fluid in the right eye

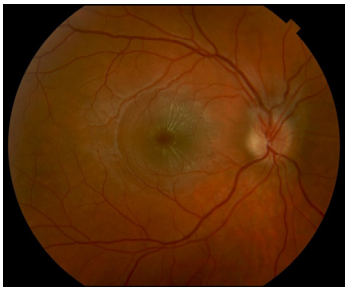

Figure 1: Fundus photo of the right eye at presentation. Fundus photo of the right eye at presentation demonstrated edema of the optic nerve and lipid exudates in the macula in a macular star pattern. Visual acuity was 20/200 and no optic nerve pit or retinal vascular occlusions were identified.

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(Figure 5). There was subtle thickening of the outer nuclear layer in the nasal macula in the right eye. SD-OCT of the left eye identified minimal punctuate intraretinal hyper-reflective deposits in the nasal macula overlying an area of focal irregularity of the retinal outer segments. There was no retinal thickening or fluid on the SD-OCT of the left eye (Figure 6). Serologies revealed elevated *Bartonella* titers and Infectious Disease consultation recommended oral doxycycline and rifampin because of the patient's fulminant presentation with severe visual loss in the right eye.

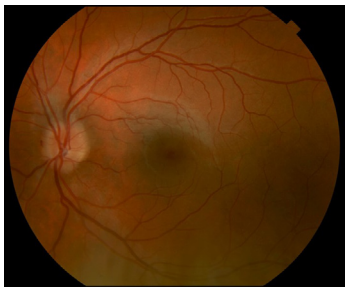

Figure 2: Fundus photo of the left eye at presentation. Fundus photo of the left eye at presentation demonstrated a discrete splinter nerve fibre layer hemorrhage and mild disc edema, but no retinal exudates. Visual acuity was 20/20 and this eye was asymptomatic.

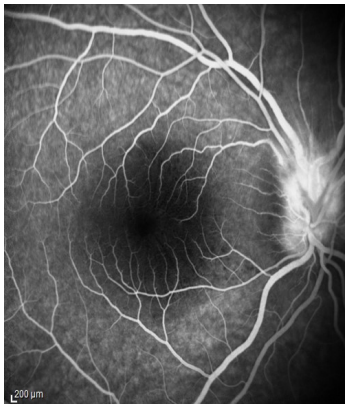

Figure 3: FA of the right eye at presentation. FA of the right eye at presentation revealed intense optic nerve hyperfluorescence. The macular retinal vasculature was without leakage, vasculitis, or occlusions.

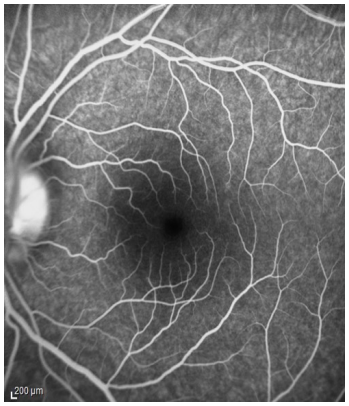

Figure 4: FA of the left eye at presentation. FA of the asymptomatic left eye at presentation showed less extensive optic nerve hyperfluorescence without retinal vascular leakage.

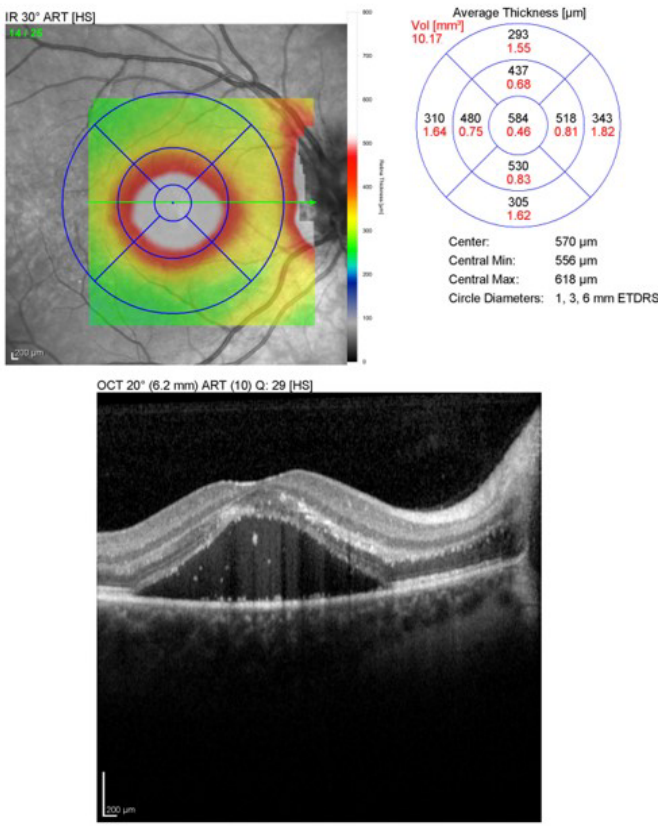

Figure 5: SD-OCT of the right eye at presentation. SD-OCT image of the right eye at presentation revealed hyper-flective deposits within the outer plexiform layer at the fovea with obscured visualization of underlying retinal layers. Similar hyper-reflective deposits were also identified within the hypo-reflective subretinal fluid. There was also thickening of the outer nuclear layer in the nasal macula.

At one week follow-up, the patient's scotoma improved along with visual acuity from 20/200 to 20/70 in the right eye. The left eye remained asymptomatic with visual acuity of 20/20. SD-OCT of the right eye at one week demonstrated improved hyper-reflective intraretinal deposits and hypo-reflective subretinal fluid (Figure 7). FAF showed a well-defined central circular pattern of hyper-autofluorescence in the right eye and a subtle wedge shaped pattern of temporal peripapillary hyper-autofluorescence extending into the macula in the asymptomatic left eye (Figure 8). Of all the imaging modalities, FAF was able to detect pathology not well delineated by other techniques.

At the three month follow up visit, the patient experienced resolution of the scotoma in the right eye with good visual recovery (improvement to 20/40). The left eye remained asymptomatic, maintained 20/20 visual acuity, and was free of fluid. The exudates had nearly completely resolved in the right eye (Figure 9) and SD-OCT demonstrated resolution of the intraretinal hyper-reflective deposits and subretinal hypo-reflective fluid (Figure 10). FAF revealed normalization of the hyper-autofluorescence pattern in both eyes without progression to hypo-autofluorescence in either eye (Figure 11).

Discussion

Infectious neuroretinitis typically presents with optic nerve and

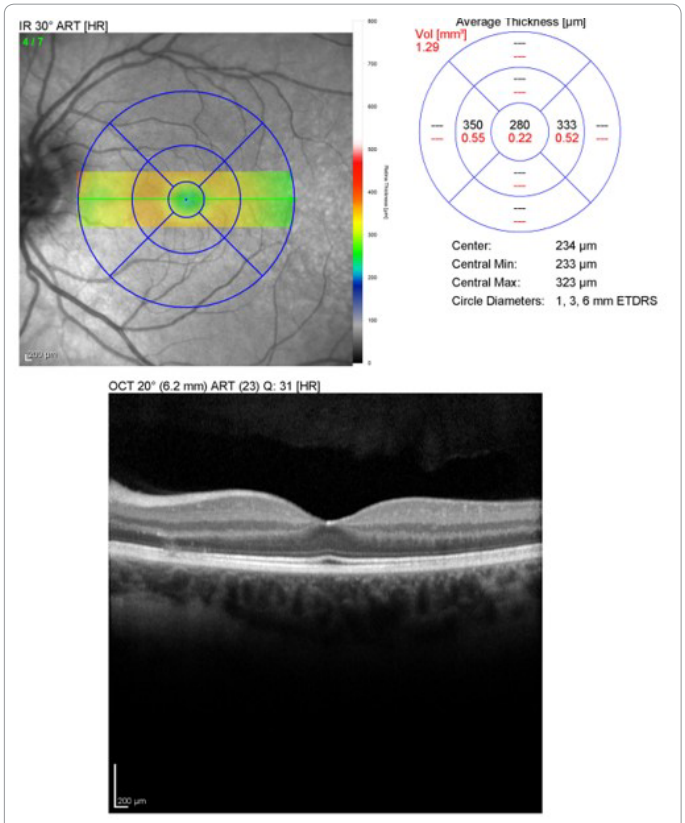

Figure 6: SD-OCT of the left eye at presentation. SD-OCT image of the asymptomatic left eye at presentation revealed normal foveal contour with punctate intraretinal hyper-reflective deposits in the nasal macula. There was a slightly irregular but intact outer retinal segment boundary. There was no retinal thickening or fluid in the left eye.

retinal edema as well intraretinal exudates in a stellate pattern, typically within the outer plexiform layer [3-5]. Other previously described clinical manifestations have included retinal vascular occlusions and even full thickness macular holes [6]. This clinical entity has been characterized previously by fundus photography, SD-OCT, and FA, but this is the first study to classify FAF findings in the symptomatic and contralateral asymptomatic eye of a patient with serologically confirmed *Bartonella* neuroretinitis.

FAF is an imaging modality used to assess the integrity of the RPE by non-invasive excitation of the A2E lipofuscin, the main fluorophore contained within the RPE [7], but other fluorophores such as DHP-A2-PE, A2E-DHP-PE, A2 GPE, monofuran-A2E and monoperoxy-A2E also contribute to the FAF signal [8].

Abnormal patterns of FAF have been documented in several chorioretinal conditions ranging from Stargardt's Disease to Age-Related Macular Degeneration [9]. For example, in hydroxychloroquine toxicity, progression from hyper-autofluorescence to hypo-autofluorescence is believed to occur after permanent, irreversible injury to RPE [10]. In our patient, the return to a near normal appearance of the FAF pattern, rather than progression to hypo-autofluorescence, suggested that the RPE did not sustain a longstanding insult. The maintenance of the IS/OS line on SD-OCT in the fovea of the right eye also supported the ultimate recovery of vision in this patient.

FAF demonstrated a radial pattern of hyper-autofluorescence in this patient's symptomatic right eye, signaling localized RPE disturbance in the macula secondary to accumulation of subretinal fluid [11]. Interestingly, FAF also revealed a subtle pattern of hyper-autofluorescence in the patient's asymptomatic left eye. The extent of this RPE disturbance could not be detected by clinical examination or as effectively by SD-OCT or FA of the left eye. We have demonstrated that in *Bartonella* neuroretinitis, FAF best demonstrated localized RPE dysfunction despite the lack of exudative signs on examination, SD-OCT and FA; such findings have only been noted previously in non-infectious etiologies, such as Retinitis pigmentosa and cone dystrophy [9].

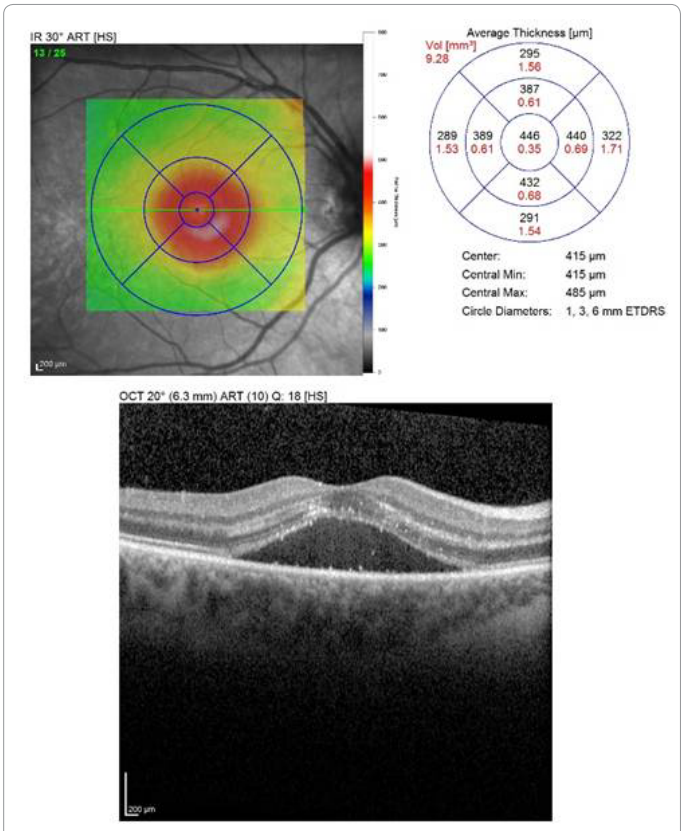

Figure 7: SD-OCT of the right eye at week one. SD-OCT of the right eye at one week demonstrated improved hyper-reflective intraretinal deposits and hypo-reflective subretinal fluid.

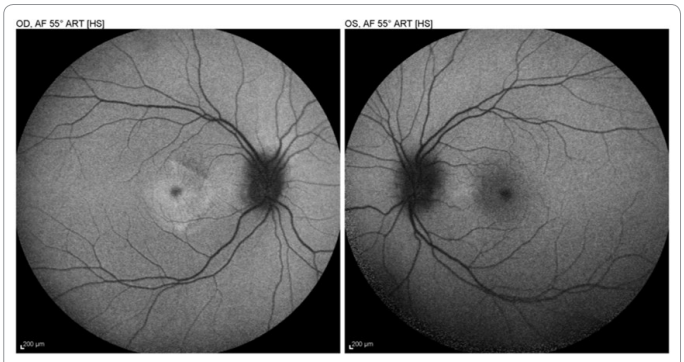

Figure 8: FAF of both eyes at week one. FAF at one week demonstrated subtle linear areas of hyper-autofluorescence corresponding to the macular star spokes emanating from the fovea surrounded by a larger rim of hyper-autofluorescence in the right eye, which highlighted the extent of the subretinal fluid. FAF of the left eye showed a focal area of hyper-autofluorescence temporal to the disc, without extension into the perifoveal territory.

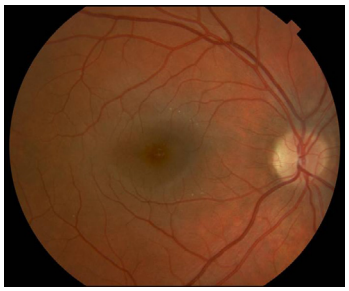

Figure 9: Fundus photo of the right eye at three months. Fundus photo of the right eye three months after presentation demonstrated residual nasal optic disc edema and minimal hard exudates in a radial pattern around the fovea with an irregular foveal light reflex.

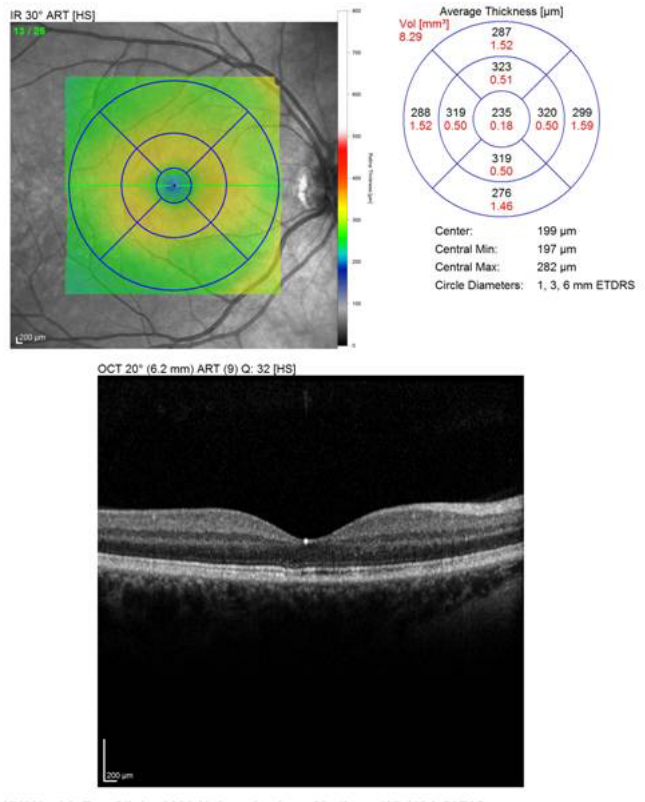

Figure 10: SD-OCT of the right eye at three months. SD-OCT image of the right eye at three months revealed normalization of the foveal contour, clearance of the hyper-reflective intraretinal deposits and resolution of the hypo-reflective subretinal fluid.

We hypothesize that the initial leakage from the inflamed optic nerve in both eyes caused a transient diffuse injury to the RPE, which gradually resolved as the optic nerve inflammation subsided. It is likely the optic nerve rather than the retina represented the primary source of inflammation in infectious neuroretinitis; in the early stages, such inflammation can be visually insignificant, as was the case of this patient's left asymptomatic left eye.

The natural history of *Bartonella* neuroretinitis is typically spontaneous resolution. Although management with systemic steroid and antibiotics has been described [12], such treatment is not universally advocated [13]. The decision to treat our patient with

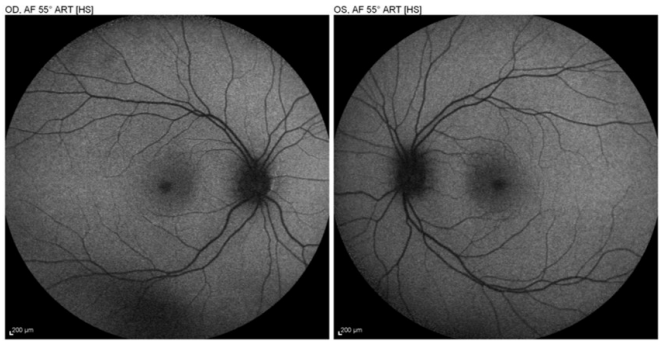

Figure 11: FAF of both eyes at three months. Fundus autofluorescence image of both eyes at three months revealed near normalized pattern of autofluorescence in each eye. The image demonstrated resolution of the hyper-autofluorescence without progression to hypo-autofluorescence.

systemic oral antibiotics was influenced by his initial severe vision loss in the right eye. In summary, we recommend the use of FAF in patients with infectious *Bartonella* neuroretinitis as a fast and readily available tool for the detection of asymptomatic pathology and the monitoring of clinical course over time.

Summary Statement

We present a case report of a 26-year old male who developed infectious neuroretintis, confirmed to be caused by ***Bartonella*** *hensellae* on serologic testing. Fundus autofluorescence (FAF) as well as other imaging modalities—including spectral-domain optical coherence tomography (SD-OCT) and fluorescein angiography (FA)—were used to identify and follow subtle anatomic abnormalities throughout the disease course, highlighting pathology in both the symptomatic right eye and asymptomatic left eye. FAF provided novel imaging features and proved to be a valuable imaging modality in this rare clinical entity.

References

1. Biancardi AL, Curi AL (2014) Cat-scratch disease. Ocul Immunol Inflamm 22: 148-154.
2. Longmuir RA, Lee A (2014) Cat-scratch neuroretinitis (Ocular bartonellosis): 44 year-old female with non-specific "blurriness" of vision, left eye.
3. Lee AG, Brazis PW (2003) Optic disc edema with a macular star and neuroretinitis. In: Lee AG, Brazis PW (eds) Clinical pathways in Neuro-Ophthalmology: An Evidence Based Approach. Thieme New York, New York, pp: 63-67.
4. Agarwal A (2011) Macular star. In: Agarwal A (ed.) Gass' Atlas of Macular Diseases (4thedn.) Elsevier Science Health, USA, pp: 44-45.
5. Solley WA, Martin DF, Newman NJ, King R, Callanan DG, et al. (1999) Cat scratch disease: posterior segment manifestations. Ophthalmology 106: 1546-1553.
6. Seth A, Raina UK, Thirumalai S, Batta S, Ghosh B1 (2015) Full-thickness macular hole in *Bartonella* henselae neuroretinitis in an 11-year-old girl. Oman J Ophthalmol 8: 44-46.
7. Delori FC, Dorey CK, Staurenghi G, Arend O, Goger DG, et al. (1995) In vivo fluorescence of the ocular fundus exhibits retinal pigment epithelium lipofuscin characteristics. Invest Ophthalmol Vis Sci 36: 718-729.
8. Smith RT, Post R, Johri A, Lee MD, Ablonczy Z, et al. (2014) Simultaneous decomposition of the multiple hyper-spectral data sets: Signal recovery of unknown fluorophores in the retinal pigment epithelium. Biomed Opt Express 5: 4171-4185.
9. Fleckenstein M, Schmitz-Valckenberg S, Holz FG (2010) Fundus autofluorescence imaging in clinical use. Review of Ophthalmology.
10. Mititelu M, Wong BJ, Brenner M, Bryar PJ, Jampol LM, et al. (2013) Progression

of hydroxychloroquine toxic effects after drug therapy cessation: new evidence from multimodal imaging. JAMA Ophthalmol 131: 1187-1197.

11. Ayata A, Unal M, Erşanli D, Tatlipinar S (2009) Fundus autofluorescence imaging of macular star. Acta Ophthalmol 87: 690-691.

12. Raihan AR, Zunaina E2, Wan-Hazabbah WH2, Adil H2, Lakana-Kumar T1 (2014) Neuroretinitis in ocular bartonellosis: a case series. Clin Ophthalmol 8: 1459-1466.

13. Prutsky G, Domecq JP, Mori L, Bebko S, Matzumura M, et al. (2013) Treatment outcomes of human bartonellosis: a systematic review and meta-analysis. Int J Infect Dis 17: e811-819.