Epidemic retinitis with positive or negative Weil Felix Test - a comparative study and outcome with doxycycline.

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Research Article

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Posted Date: May 4th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-492761/v1

Title: Epidemic retinitis with positive or negative Weil Felix Test - a comparative study and outcome with doxycycline.

Abstract:

Purpose: To compare clinical manifestations and disease outcomes in Epidemic Retinitis (ER) with positive or negative Weil Felix Test (WFT).

Methods: Retrospective, observational, comparative study. WFT positive or negative patients formed Group 1 and 2 respectively. Patients receiving oral doxycycline monotherapy formed subgroup A and B. Duration of resolution of macular edema and retinitis was compared.

Results: Novel finding of "ring retinitis" was observed equally in group 1 and 2. Complete resolution of macular edema took 41.3 days (range: 30-60 days) and 43.68 days (range: 20-105 days) (p=0.668) and retinitis lesions resolved in 34.3 days (range: 14-65 days) and 34 days (range: 12-60 days) (p=0.875) in group A and B respectively. All (n=14) eyes with retinitis within 1 disc diameter of fovea improved better than 20/80 except 1.

Conclusion: No significant difference with respect to clinical, imaging findings and the treatment outcome was observed in WFT positive or negative cases.

Key words: Epidemic retinitis, Rickettsial retinitis, Post fever retinitis, Weil Felix test, Treatment outcome, Doxycycline, Steroid, Anti-VEGF, Ring retinitis

Introduction: Epidemic retinitis is an uveitic entity of heterogenous etiology like Chikungunya, Dengue, West Nile virus and Rickettsial organisms.[1] Patients typically present with history of a recent fever. In many cases the diagnosis of the fever remains uncertain due to non-specific systemic manifestations. Ophthalmologists can play a key role in narrowing down differential diagnosis by identifying characteristic fundus lesions. Various reports described grossly similar morphological pattern of posterior uveitis with multifocal retinitis caused by Chikungunya, Dengue, West Nile virus and Rickettsia.[2-5] Among these causative agents, rickettsia being caused by bacteria stands out from the list. Fever, headache, skin rash, myalgia can be the common manifestations of rickettial and other non-rickettsial diseases. But certain findings like presence of eschar, or tache noire (black spot) at the site of tick bite, macular petechial rash of the palms can be differentiating features of rickettial diseases.[6, 7] Whereas predominant musculo-sckeletal symptoms may differentiate Chikungunya from other diseases.[8] In most of the cases systemic manifestations are resolved or fading away by the time patients develops ocular symptoms and present to the ophthalmologists. As far as ocular manifestations are concerned, dengue maculopathy,[9] or chorio-retinal “target lesions” along the nerve fiber layer in west nile virus,[10] have been described as characteristic lesions of respective disease entity. Rickettsial uveitis can have one or more of following findings: mild to moderate non granulomatous anterior uveitis, mild to moderate vitritis, disc and macular edema, and cotton wool spots like yellowish white retinitis lesions, with or without hemorrhages and focal vascular sheathing or multiple arterial plaques and vascular occlusions.[11-13] These clinical features can be seen in Chikungunya, Dengue and West Nile virus retinitis as well. Hence clinical diagnosis is difficult and clinician has to rely on laboratory investigations. The gold standard test, immunofluorescence assay (IFA) or other tests like microimmunofluorescence, latex agglutination, indirect hemagglutination,

immunoperoxidase assay, and enzyme-linked immunosorbent assay for diagnosis of rickettsial diseases are costly or not readily available. Although less sensitive (43%) and specific (98%),[14] Weil Felix Test (WFT) is widely used in clinical practice. The baseline titers require standardized for each geographical region and the cut-off values may vary from 1:80 to 1:160.[15, 16] The aim of this study was to compare clinical manifestations and the disease outcomes in patients diagnosed with ER and who tested positive or negative for WFT. We also evaluated outcome with oral doxycycline monotherapy with or without topical steroids and/or topical non-steroidal anti-inflammatory drugs (NSAID).

Subjects and Methods: This is a retrospective, observational, comparative study of patient diagnosed as ER who presented to a tertiary care eye hospital in South India from October 2016 to February 2021. The study was approved by internal review board and adhered to the declarations of Helsinki. Patients with history of recent fever who presented with focal or multifocal "cotton wool spot (CWS)-like" retinitis lesions as described previously were diagnosed as cases of ER.[1, 17] Cases in which at least WFT, serology for Chikungunya, Dengue and WIDAL was done were included in the study. Patients who tested positive for WFT and negative for Chikungunya, Dengue serology, and WIDAL were classified as Group 1 and cases who tested negative for WFT were classified as Group 2. History of present illness including presence or absence of fever, skin rash, joint pain and the diagnosis of the fever made by the physicians was noted. Corrected distant visual acuity (CDVA), clinical ocular findings with slit-lamp biomicroscopy and indirect ophthalmoscopy were noted. Findings on fundus photo, Spectral domain optical coherence tomography (SD-OCT) in all cases, and fundus fluorescein angiography (FA) in selected cases were studied by single observer (AK). Patient's laboratory investigations were noted. Human Immunodeficiency Virus infection (by ELISA) and syphilis

(by Treponema Pallidum Haemaglutination test) was ruled out in all cases. WFT was considered positive when the titers were more than 1:160 for OX-K and more than 1:80 for OX-2 and OX-19.[15, 16]

To study treatment outcomes, cases receiving identical treatment modalities (T. Doxycycline, topical prednisolone and /or topical Nepafenac) were isolated from group 1 and 2 to form subgroup A and B respectively. Cases without SD-OCT scans at the presentation and at the resolution were excluded. Macular edema was measured by single observer (AK) on the SD-OCT scan at its highest peak. (Figure 1) Days taken for complete resolution of macular edema as evident on OCT scan and days for resolution of retinitis lesions as documented in the case records and/or on the fundus photo were studied along with their final CDVA for both the groups. Resolved macular edema was defined as absence of subretinal fluid and intra-retinal hypo-reflective spaces on the OCT scan. Macular thickness was measured at the resolution on the OCT scan. CDVA and days taken for resolution of macular edema and retinitis for group A and B together was also studied to assess efficacy of oral doxycycline monotherapy (that is without oral, periocular, intraocular steroids and/or anti-vascular growth factor inhibitors (VEGFs). Visual outcomes in eyes with retinitis lesions within 1 disc diameter from center of fovea was also studied using Heidelberg eye explorer marking tool software on the OCT scan.

Statistical analysis:

All data was entered in Microsoft Excel (Office 365). Continuous data was checked for normality using the Shapiro-Wilk test. Categorical variables were presented as proportions and continuous variables as mean and standard deviation. The Chi-square test was used to compare categorical variables and the Mann Whitney U test was used for the comparison of means. A p-value of less than 0.05 was considered significant.

Results: We studied 70 eyes of 43 patients diagnosed with ER. Group 1 included 34 eyes of 20 patients and group 2 included 36 eyes of 23 patients. Mean age of presentation in group 1 was 42.55 years (range: 16-73years) and in group 2 was 37.78 years (range: 17-71 years). Male to female ratio was 12:8 in group 1 and 15:8 in group 2. Six patients had unilateral disease in group 1 and 10 in group 2. All the patients gave history of a recent fever, but provisional etiological diagnosis made by the physician was available only in few: Typhoid (n=1), Chikungunya (n=1), Dengue (n=2), viral (n=1), subacute bacterial meningitis (n=1) in group 1 and typhoid (n=1), viral fever (n=4), viral meningo-encephalitis with septicemia (n=1), lower respiratory tract infection with uro-sepsis (n=1), typhoid (n=2) in group 2. Mean duration between the onset of the fever and ocular symptoms (latent period) was 22.33 days (range: 7-50 days) in group 1 and 21.55 days (range: 7-45 days) in group 2. History of skin rashes along with fever was present in 8/20 cases in group 1 and only in 4/23 cases in group 2, (p=0.099) whereas arthralgia was present in 3/20 in group 1 and 7/20 in group 2. (p=0.232)

Presenting CDVA was 20/160 in group 1 and 20/125 in group 2. In group 1, mild-moderate anterior chamber reaction (not exceeding 3+ cells) was noted in 17 eyes (50%) out of which13 had non granulomatous keratic precipitates (KPs). In group 2, mild to moderate anterior chamber reaction was seen in 13 (50%) eyes of which 7 had non-granulomatous KPs. (p=0.082) Mild to moderate vitritis was present in all the cases in both the groups. Vitreous haze never exceeded beyond 2+ in both the groups. Disc edema was present in 8 eyes in group 1 and in 4 cases in group 2. (p=0.168) No relative afferent pupillary defect was noted in any case. Cotton wool sopt (CWS)-like retinitis lesions were present in all the patients. Theses lesions were arranged in ring-like manner with few hemorrhages in the center (4 eyes in group 1 and 5 in group 2). (Figure 2) Focal arteriolitis was appreciated in 7 eyes from each. Subretinal precipitates were seen in 3 eyes

in group 1 and 6 eyes in group 2. (p=0.327) Macular fan or macular star was appreciated in 14 eyes in group 1 and 13 eyes in group 2. (p= 0.663) (Table 1)

SD-OCT scan at the presentation was available for 28 eyes in group 1 and 31 eyes in group 2. Inner retinal thickening with after shadowing was seen in all the patients at the site of retinitis lesions on SD-OCT scan. Near full thickness involvement was appreciated in 4 and 6 cases each in group A and B respectively. Outer nuclear layer edema was present in 14 and 20 eyes in group 1 and 2 respectively. Subretinal fibrin was present in 14 and 12 eyes each in group A and B respectively. Subretinal fluid was present in 19 and 25 eyes respectively in group 1 and 2. (p=0.241) Hard exudates in outer plexiform layer were present in 16 and 12 eyes in group 1 and 2 each. Macular edema was present in 24 eyes in group 1 and 30 eyes in group 2. Mean thickness of macular edema at its highest peak as seen on OCT scan at the presentation was 783.8µm (range: 470-1324µm) in group 1 and 757.6µm (range: 409-1240µm) in group 2. (p=0.663) (Table 1) Fundus Fluorescein angiography (FA) was available for 4 eyes in each group. FA at the site of the ring retinitis lesions showed a patch of hypofluorescence which turned isofluorescent in late phase with mild vascular leakage of the vessels passing through it. (Figure 3)

Analyzing WFT, OX2 was positive in 16 cases, OX 19 was positive in 11 and OX K was positive in 3 cases in group 1. Two cases which showed OX K positivity were also found positive for OX2 and OX 19. Based on the WFT, 6 patients were diagnosed as Indian tick typhus, 3 as epidemic or endemic typhus and rest remained unclassified. In group 2, Chikungunya IgG was positive in 1/15, Dengue IgG was positive in 6/17, Dengue IgM was positive in 1/17 and WIDAL was positive in 2/16 cases.

Treatment outcomes were studied for group A and B. (Table 2) Group A included 10 eyes of 8 patients and group B included 19 eyes of 15 patients. Mean CDVA at the presentation was 20/160 in both the groups (range: 20/30 - 20/2000). (p=0.839) All the patients received oral doxycycline 100mg twice a day for 3-4 weeks. Topical prednisolone acetate 1% 4 times/day in tapering dose were given for 4 and 6 eyes in group A and B respectively. Topical nepafenac 0.1% was given for 8 and 7 eyes in group A and B respectively. None of the patients received systemic, periocular or intraocular steroids or anti-VEGF. Mean thickness of macular edema was 759.2 µm (range: 496 - 1097µm) in group A and 776.5µm (range: 409-1240µm) in group B at the presentation. (p=0.875) Mean duration of complete resolution of macular edema was 41.3 days (range: 30-60 days) and 43.68 days (range: 20-105 days) for group A and B respectively. (p=0.668) Mean duration of resolution of retinitis lesions were 34.3 days (range: 14-65 days) and 34 days (range: 12-60 days) for group A and B respectively. (p=0.875) CDVA improved to 20/30 in both the groups at the resolution (range: 20/20 - 20/40 in group A and 20/20 - 20/160 in group B). (p=0.456)

Combining groups, A and B we had 29 eyes of 23 patients treated with oral doxycycline monotherapy with or without topical steroids and/or topical NSAIDs. Mean presenting CDVA was 20/160 (range: 20/30-20/2000) which improved to 20/30 (range: 20/20-20/160). Macular edema resolved in 42.86 days (range: 20-105 days) and retinitis resolved in 34.13 days (range: 12-60 days). Fourteen eyes of 14 patients had retinitis lesion within 1 disc diameter of center of fovea, 6 with macular star/fan. Presenting CDVA was 20/160 (range: 20/30-20/2000) which improved to 20/32 (range: 20/20-20/160). All improved better than 20/80 except 1 who had severe subretinal deposits, ellipsoid zone loss and foveal thinning but had improved from 20/2000 to 20/250 in 20 days and later to 20/160.

Discussion:

Epidemic retinitis is a recently described uveitic entity which clubs together morphologically similar posterior or panuveitis of different etiologies. Akin to that of Fuchs' uveitis which can be caused by viruses like CMV, HSV, VZV and rubella,[18, 19] or serpiginous like choroiditis which can be caused by tuberculosis, viruses, or which may remain idiopathic,[20] ER also has unique clinical presentation, but etiology can be different. In this study we divided ER into WFT positive and negative groups in an attempt to find subtle clinical differences. We found no significant difference in terms of ophthalmic clinical presentation, imaging findings on OCT scan and the treatment outcomes in both the groups. Age of presentation and latent period was similar in both the groups, but incidence of skin rash was observed more in group 1 whereas incidence of joint pain was noted more in group 2. But this was statistically insignificant. In group 2 viral etiology of the fever was suspected in relatively more number of patients by their physicians, but in group 1 possibility of rickettsial fever was not considered by them. Ophthalmologists may play a vital role by assisting physician to suspect rickettsial disease as one of the possible differential diagnosis for the fever and avoiding unnecessary investigations, but unfortunately ocular manifestations of the disease generally start once the fever is subsided. As noted in our study the mean latent period was almost 3 weeks. It is possible that the patients may develop extramacular CWS-like retinitis lesions during the fever or few days after the onset of the fever but the ocular symptoms start once the macular edema or anterior uveitis develops. It would be worth screening for retinal lesions if the physicians are suspecting chikungunya, dengue, typhoid or pyrexia of unknown origin during a specific season (August-April) in tropical countries like India.

One of the interesting findings noted in this study was the “ring of retinitis lesions.” (Figure 2) This was observed not only at the posterior pole but also in the midperiphery of the retina. Since the FA revealed early hypo and late iso-fluorescence at these lesions, we believe these lesions could be large patches of retinitis which are clearing at its center. Presence of this sign can help to differentiate other retinitis entities like toxoplasma retinitis, acute retinal necrosis, cytomegalovirus retinitis and masquerades like lymphoma. No statistically significant difference was observed on clinical as well as on SD-OCT imaging for retinitis lesions between group 1 and 2. (Table 1) Number of eyes with arteriolitis were also similar in both the groups. In 2 eyes of 2 patients it mimicked kyrieleis vasculitis as described by Khairallah et al.[11]

Assessing treatment outcome, as in group A, all the patient of group B also received oral doxycycline with or without topical steroids or NSAID even though WFT was negative. This treatment was started empirically before the laboratory investigations were available, taking into consideration high prevalence of rickettsial and dengue associated uveitis in our region.[17, 21] Thus, we had 2 groups (Group A and B) with positive and negative WFT respectively receiving identical treatment: Oral doxycycline, with or without topical steroids or topical NSAID, but without oral / periocular or intraocular steroids or anti-VEGFs. No significant difference was noted in duration of resolution of macular edema (p= 0.668) and retinitis lesions (p=0.875) in both the groups. Visual outcome also remained equivocal in both the groups. (p=0.456). Recently Sundar et al have reported a series of post-fever retinitis cases encouraging the use of anti-VEGF and oral steroids few days after oral doxycycline.[22] In contrast to their study, group A and B in our series (total 29 eyes of 23 patients) have effectively documented good visual outcome without the need of oral steroids or anti-VEGF as reported previously.[17] Even after

considering the cases where retinitis lesions were within 1 disc diameter of center of fovea, visual outcome remained good, but the number of cases were small to derive a firm conclusion.

The main drawback of our study was lack of gold standard investigations to make a firm etiological diagnosis. Secondly, relatively a smaller number of patients in the treatment groups A and B and finally, the retrospective nature, and single observer bias which limited the strength of the study. FA was also available in limited number of patients in our study to firmly conclude on the pathogenesis of the "ring-retinitis." The merits of our study were, we describe a novel fundus finding of "ring retinitis" typical for ER; our study has shown that regardless positivity or negativity of WFT, clinical presentation, SD-OCT findings and the treatment outcome in ER does not vary significantly. We have also shown that mere topical steroids with or without NSAID and oral doxycycline monotherapy adequately achieves resolution with good visual outcome in most of the cases of ER. This may support the fact that despite heterogenous etiology ER can be considered as a single uveitic entity. Further larger studies using gold standard laboratory investigations are needed to support our observations.

References:

1. Kawali A, Mahendradas P, Mohan A, Mallavarapu M, Shetty B. Epidemic Retinitis. Ocul. Immunol. Inflamm. 2019;27:571-577. doi: 10.1080/09273948.2017.1421670.

2. Mahendradas P, Avadhani K, Shetty R. Chikungunya and the eye: a review. J. Ophthalmic Inflamm. Infect. 2013;3:35.

3. Gupta A, Srinivasan R, Setia S, Soundravally R, Pandian DG. Uveitis following dengue fever. Eye (Lond) 2009; 23:873-876.

4. Sivakumar RR, Prajna L, Arya LK, Muraly P, Shukla J, Saxena D et al. Molecular diagnosis and ocular imaging of West Nile virus retinitis and neuroretinitis. Ophthalmology 2013;120:1820-1826.

5. Agahan A, Torres J, Fuentes-Páez G, Martínez-Osorio H, Orduña A, and Calonge M. Intraocular inflammation as the main manifestation of Rickettsia conorii infection. Clin. Ophthalmol. 2011;5:1401–1407.

6. Stewart AGA, Smith S, Binotto E, McBride WJH, Hanson J. The epidemiology and clinical features of rickettsial diseases in North Queensland, Australia: Implications for patient identification and management. PLoS Negl Trop Dis. 2019;13(7):e0007583. Published 2019 Jul 18. doi:10.1371/journal.pntd.0007583.

7. Thomas EA, John M, Kanish B. Mucocutaneous manifestations of Dengue fever. Indian J Dermatol. 2010;55(1):79-85. doi:10.4103/0019-5154.60359

8. Pathak H, Mohan MC, Ravindran V. Chikungunya arthritis. Clin Med (Lond). 2019;19(5):381-385. doi:10.7861/clinmed.2019-0035.

9. Mehkri M, Jayadev C, Dave N, Vinekar A. Spectral domain optical coherence tomography in the diagnosis and monitoring of dengue maculopathy. Indian J Ophthalmol 2015;63:342-3.

10. Khairallah M, Ben Yahia S, Ladjimi A, Zeghidi H, Ben Romdhane F, Besbes L, Zaouali S, Messaoud R: Chorioretinal involvement in patients with West Nile virus infection. Ophthalmology 2004; 111: 2065–2070.

11. Khairallah M, Ladjimi A, Chakroun M, Messaoud R, Yahia SB, Zaouali S, Romdhane FB, Bouzouaia N (2004) Posterior segment manifestations of Rickettsia conorii infection. Ophthalmology 111:529–34

12. Kawali A, Mahendradas P, Srinivasan P, Yadav NK, Avadhani K, Gupta K, et al. Rickettsial retinitis—an Indian perspective. J Ophthalmic Inflamm Infect 2015;5:37-43.

13. Balasundaram MB, Manjunath M, Baliga G, Kapadi F. Ocular manifestations of Rickettsia conorii in South India. Indian J. Ophthalmol. 2018;66:1840-1844.

14. Sharma A, Mishra B. Rickettsial disease existence in India:Resurgence in outbreaks with the advent of 20th century. Indian J Health Sci Biomed Res 2020;13:5-10.

15. Ajantha GS, Patil SS, Chitharagi VB, Kulkarni RD. Rickettsiosis: a cause of acute febrile illness and value of Weil-Felix test. Indian J. Public Health. 2013;57:182-183

16. Roopa KS, Karthika K, Sugumar M, Bammigatti C, Shamanna SB, Harish BN. Serodiagnosis of Scrub Typhus at a Tertiary Care Hospital from Southern India. J. Clin. Diagn. Res. 2015;9:DC05–DC7.

17. Kawali A, Srinivasan S, Mohan A, Bavaharan B, Mahendradas P, Shetty B. Epidemic Retinitis with Macular Edema –Treatment Outcome with and without Steroids. Ocul. Immunol. Inflamm. 2020;21:1-5.

18. Quentin CD, Reiber H. Fuchs heterochromic cyclitis: rubella virus anti- bodies and genome in aqueous humor. Am J Ophthalmol. 2004;138:46-54.

19. Chee SP, Jap A. Presumed fuchs heterochromic iridocyclitis and Posner- Schlossman syndrome: comparison of cytomegalovirus-positive and negative eyes. Am J Ophthalmol. 2008;146:883-889.

20. Nazari Khanamiri H, Rao NA. Serpiginous choroiditis and infectious multifocal serpiginoid choroiditis. Surv Ophthalmol. 2013;58(3):203-232.

21. Mahendradas P, Kawali A, Luthra S, Srinivasan S, Curi AL, Maheswari S, Ksiaa I, Khairallah M. Post-fever retinitis – Newer concepts. Indian J Ophthalmol 2020;68:1775-86.

22. Sundar D M, Chawla R., Balaji A., Garg I., Kalathil R., Hasan N, Vikas S J and Kumar A. Clinical features, optical coherence tomography findings and treatment outcomes of post-fever retinitis. Ther Adv Ophthalmol. 2020, Vol. 12: 1–10.

Legends:

Figure 1: OCT scan of right eye of a patient from group 1 showing edematous outer nuclear layer with dot hyper-reflective lesions, subretinal fluid along with subretinal fibrinous deposit can be appreciated. Macular oedema at its highest peak measured 663µm in this case.

Figure 2: Wide field fundus photo (Optos^{TM}) of a patient from group 1 shows multiple CWS like retinitis lesions with few haemorrhages and macular fan. Note the retinitis lesions on the nasal side arranged in a ring like fashion. Few subretinal deposits can also be appreciated in nasal periphery and naso-inferior quadrant.

Figure 3: Fundus fluorescein angiography a patient from group 1 shows a hypofluorescent lesion at the site of the ring retinitis lesions. Minimal vascular leakage from major vessels was seen in late phase at the site of the lesions.

Table 1: Clinical findings in group 1 and 2

		Group 1	Group 2	p=
Number of eyes/patients		34/20	36/23	
Skin rash		8 (40%)	4 (17%)	0.099
Joint pain		3 (15%)	7 (30%)	0.232
Mean presenting CDVA		20/160	20/125	
Non granulomatous KPs (eyes)		13 (38.2%)	7 (19.4%)	0.082
Disc edema		8 (23.5%)	4 (11.1%)	0.168
Ring retinitis		4 (11.7%)	5 (13.8%)	
Arteriolitis		7 (20.5%)	7 (19.4%)	
Subretinal precipitates		3 (8.8%)	6 (16.6%)	0.327
Macular fan / star		14 (41.1%)	13 (36.1%)	0.663
OCT FEATURES	Number of eyes	28	31	
	Inner retinal thickening with after shadowing	28 (100%)	31 (100%)	
	Near full thickness involvement	4 (14.2%)	6 (19.3%)	
	Outer nuclear layer edema	14 (50%)	20 (64.5%)	
	Subretinal fibrin	14 (50%)	12 (38.7%)	
	Subretinal fluid	19 (67.8%)	25 (80.6%)	0.241
	Hard exudates in outer plexiform layer	16 (57.1%)	12 (38.7%)	
	Mean thickness of macular edema at its highest peak	783.8µm (range: 470-1324µm) (n=24)	757.6µm (range: 409-1240µm) (n=30)	0.663

Table 2: Treatment outcomes in group A and B

	Group A	Group B	p=
Number of eyes	10	19	
Mean thickness of macular edema at its highest peak	759.2 µm (range: 496 - 1097µm)	776.5µm (range: 409-1240µm)	0.875
Mean thickness of macular edema at the resolution	237.6 (range: 187-276)	227.8 (range: 175-290)	0.247
Mean duration of complete resolution of macular edema	41.3	43.68	0.668
Mean duration of resolution of retinitis lesions	34.3	34	0.875
CDVA at presentation	20/160	20/160	0.839
CDVA at resolution	20/30	20/30	0.456

Figures

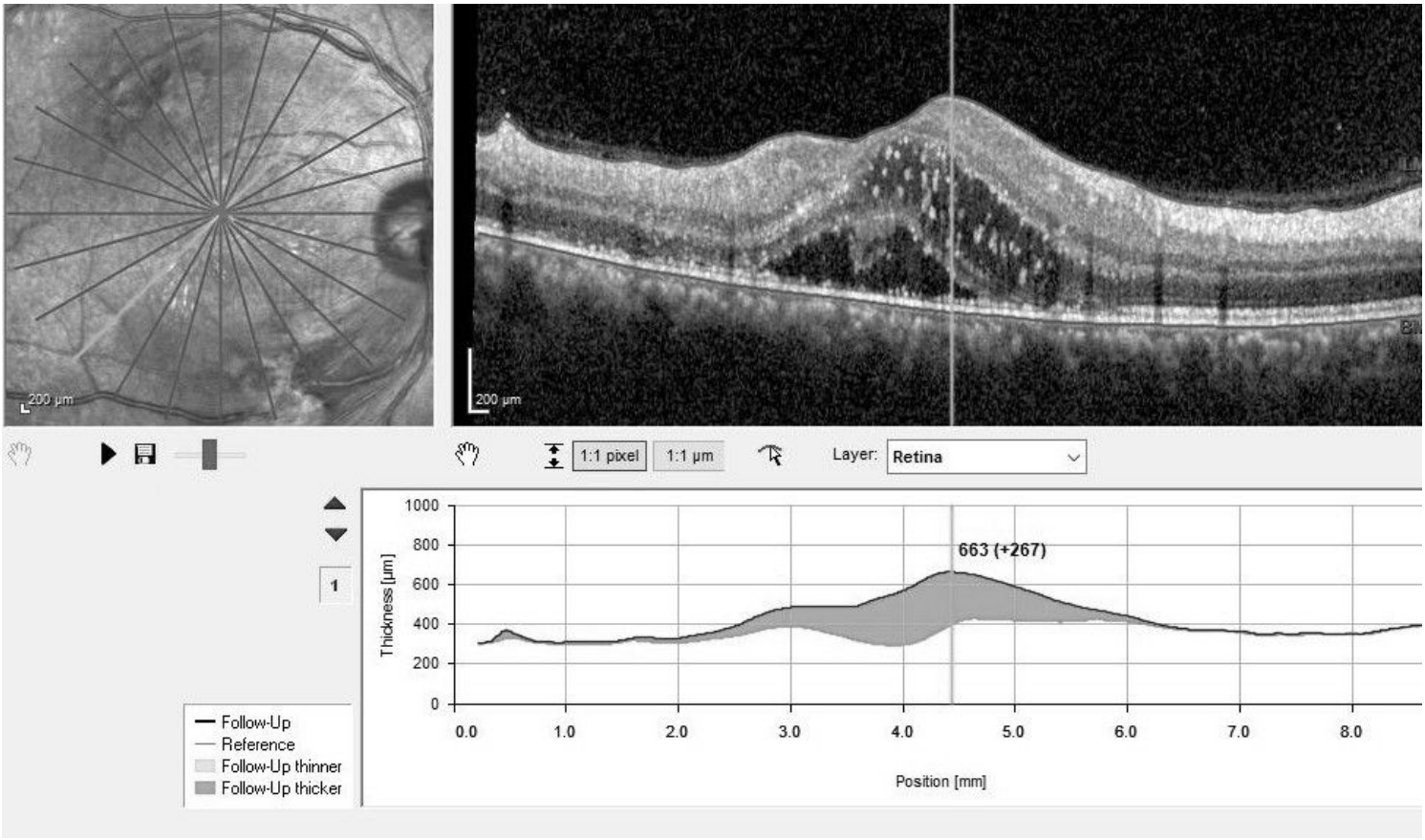

Figure 1

OCT scan of right eye of a patient from group 1 showing edematous outer nuclear layer with dot hyper-reflective lesions, subretinal fluid along with subretinal fibrinous deposit can be appreciated. Macular oedema at its highest peak measured 663µm in this case.

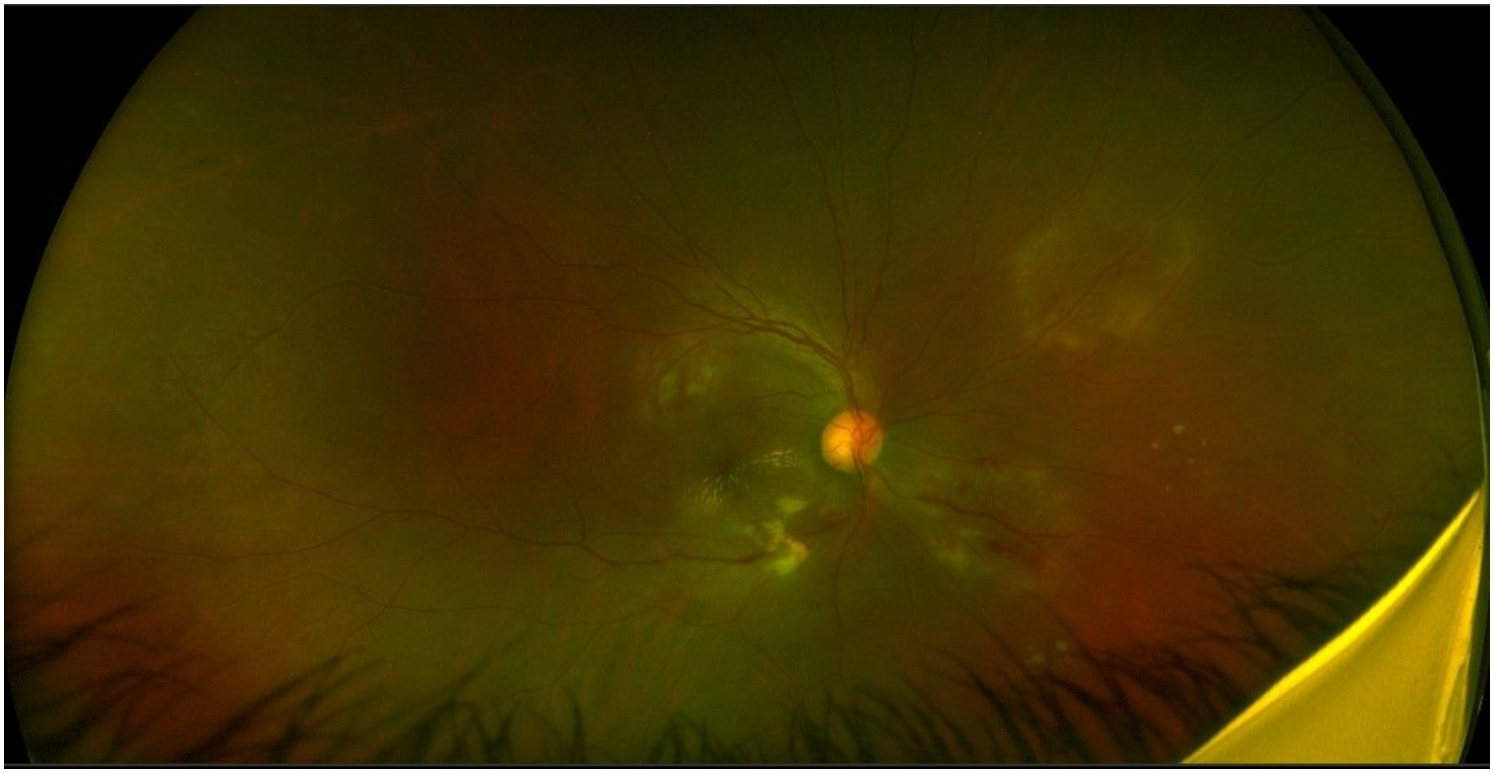

Figure 2

Wide field fundus photo (OptosTM) of a patient from group 1 shows multiple CWS like retinitis lesions with few haemorrhages and macular fan. Note the retinitis lesions on the nasal side arranged in a ring like fashion. Few subretinal deposits can also be appreciated in nasal periphery and naso-inferior quadrant.

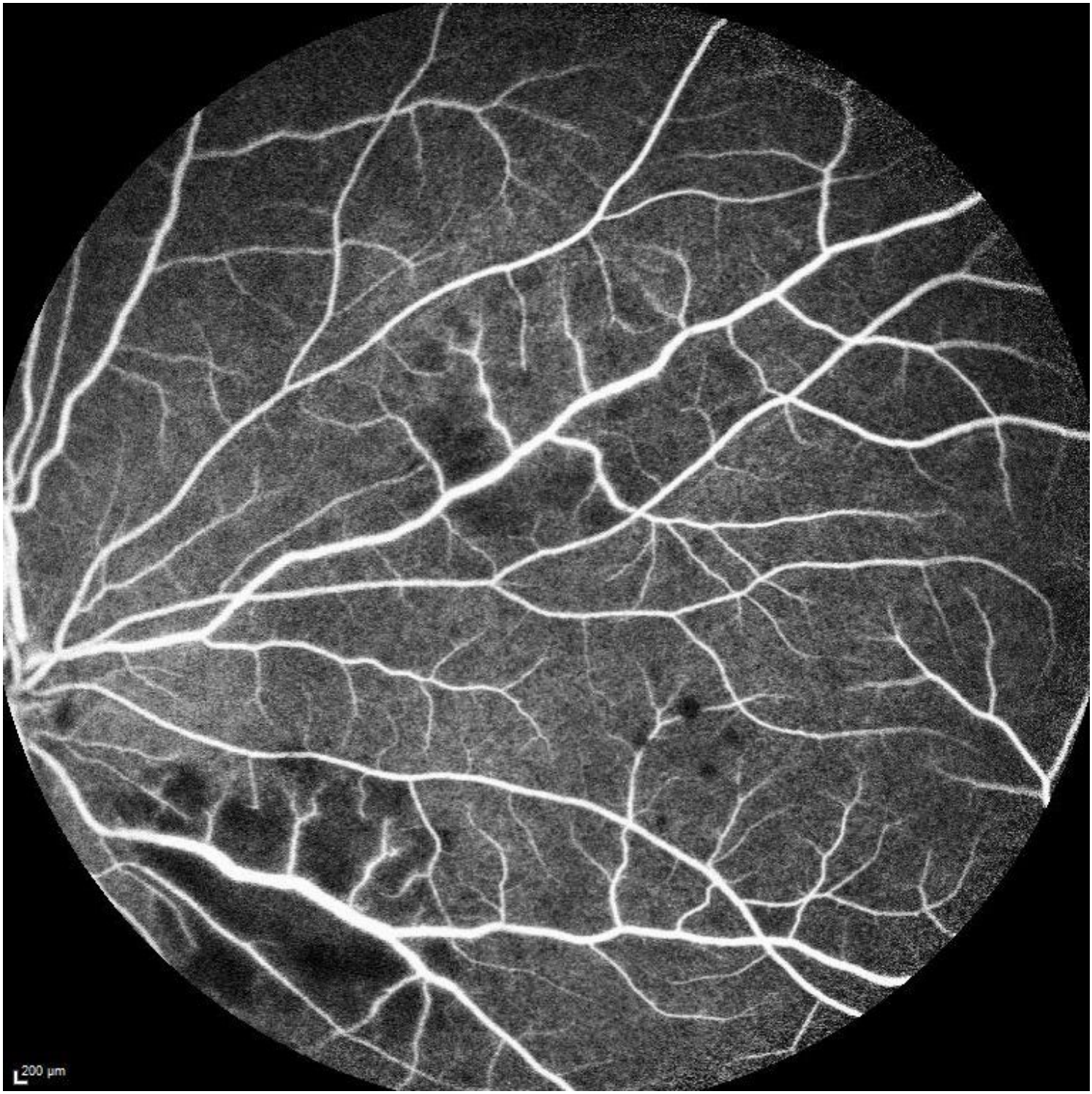

Figure 3

Fundus fluorescein angiography a patient from group 1 shows a hypofluorescent lesion at the site of the ring retinitis lesions. Minimal vascular leakage from major vessels was seen in late phase at the site of the lesions.