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Case Series

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RETINAL VASCULAR COMPLICATIONS OF DENGUE FEVER, AN UNEXPLORED ENTITY: A CASE SERIES

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ABSTRACT

Introduction: Systemic manifestations of dengue fever are well characterised, however ocular involvement has historically been considered a rare and under-recognised complication. Although less common,it can lead to visual impairment or blindness if not promptly addressed.

Case Report: We describe a case series of five patients, all with clinically and serologically confirmed dengue fever who developed retinal vascular complications. Demographic data were extracted, along with systemic history (interval between dengue infection diagnosis to the onset of ocular symptoms, and interval between visual complaint to ophthalmic evaluation), and presenting best-corrected visual acuity (BCVA). Pre-existing identifiable causes of retinal vascular occlusion (RVO) , if any, were recorded. All patients underwent fundus photo and spectral-domain optical coherence tomography (SD-OCT) examinations.

Discussion: Seven eyes of five patients were included, all patients were female with a mean age of 25.8 years (range 19-32 years). None had identifiable pre-existing risk factor for RVO. The mean interval between dengue fever diagnosis to the onset of visual symptoms was 9.6 days (range 7-14 days). Patient one presented with sequential, bilateral central retinal artery occlusion; patient two came in with bilateral Purtscher-like retinopathy. Another patients exhibited paracentral acute-middle maculopathy (PAMM), and branch retinal vein occlusion (BRVO). Presenting BCVA ranged widely from 20/20 with paracentral scotoma to 20/800, reflecting the heterogenous severity of the vascular insult across the cohort.

Conclusion: Dengue fever can produce a diverse spectrum of retinal vascular complications, typically manifesting one to three weeks after the onset of systemic illness. Spectral-domain OCT is central to the diagnosis, even when clinical examination is unremarkable. Prompt recognition and management is needed to avoid ocular complications and visual impairment.

Keywords: dengue fever, dengue eye disease, retinal vascular occlusion, macular edema

Introduction

Dengue fever is the most prevalent mosquito-borne viral illness in humans, caused by four antigenically distinct serotypes (DENV-1 to DENV-4) of the genus Flavavirus.[1-3] Transmitted primarily by the female Aedes aegypti and Aedes albopictus mosquitoes, the disease is highly endemic throughout tropical and subtropical regions of Southeast Asia, the Indian subcontinent, and Latin America.[1] Global incidence has escalated over thirthy-fold in the past five decades, driven by urbanization, international travel, and climate-induced expansion of vector habitats.[2] While the systemic manifestations of dengue – including high-grade fever, severe myalgia, thrombocytopenia, and potentially fatal plasma leakage or haemorrhagic diathesis – are well described, ophthalmic involvement is considered an unusual clinical entity.[3]

However, modern epidemiological data indicate a significant rise in dengue-related ocular morbidity. Recent prospective inpatient screening estimated a maculopathy prevalence of 4.48%,[4] while broader posterior segment involvement can occur in 5% to 8% of symptomatic cases,[5] representing a major cause of acquired visual impairment in endemic areas.

Ocular manifestations span a diverse clinical spectrum, ranging from self-limiting conjunctival hemorrhages to severe panuveitis, necrotizing scleritis, and orbital emergencies such as spontaneous globe rupture secondary to retrobulbar hemorrhage. Visual symptom onset is highly predictable, typically occurring during defervescence and the convalescence phase of infection,[1,3]when patients are often already discharged from acute medical care. Because of that, they require a high index of clinician suspicion.

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To delineate this ocular complication, especially the occlusive spectrum, we present a case series exhibiting multi-caliber retinal vascular occlusions complicating serologically confirmed dengue infection.

CASE REPORT

We conducted a retrospective, observational case series evaluated consecutive patients presenting to a secondary referral eye center with new-onset visual symptoms in the context of confirmed dengue fever who developed retinal vascular complications between 2021 and 2025. Diagnosis of dengue infection was established serologically (IgM and/or IgG) or viral NS-1 antigen detection in other health facility, in keeping with World Health Organization diagnostic criteria.[2]

The study adhered to the tenets of the Declaration of Helsinki. Institutional review board approval and a waiver of patient informed consent were obtained due to the non-interventional nature of the case review, with all patient data de-identified.

Data were extracted from medical records and included demographic details (age, sex), systemic history (date of onset of dengue-related fever, and interval between systemic diagnosis and onset of ocular symptoms), presenting best-corrected visual acuity (BCVA) and findings on dilated fundus examination. All patients underwent spectral-domain OCT (SD-OCT) and fundus photography. Patients with a pre-existing risk factors of retinal vascular occlusion (RVO) – including systemic hypertension, diabetes mellitus, hyperlipidaemia, haematological dyscrasias unrelated to dengue, hypercoagulable states, or a prior history of retinal vascular disease were excluded.

Outcome measures included presenting BCVA and qualitative OCT features at presentation. Given the descriptive nature of this series, no formal statistical hypothesis testing was performed; results are reported as means, ranges, and proportions.

Seven eyes of five patients were included, all of them were female with a mean age of 25.8 years (range 19-32 years). None had an identifiable pre-existing risk factor for RVO. The main interval between systemic diagnosis of dengue fever and the onset of visual symptoms was 9.6 days (range 7-14 days). Patient presented for ophthalmic evaluation at a mean interval of 8.2 days following visual symptom onset (range 1-20 days). Presenting BCVA ranged widely, from 20/20 with a paracentral scotoma to 20/800, with a mean presenting BCVA equivalent to approximately 20/200 (LogMAR 1.0). A summary of individual cases is presented in Table 1.

Case 1 : Sequential Bilateral Central Retina Artery Occlusion

A 23-year-old female presented nine days after the clinical diagnosis of systemic dengue fever complaining of acute, 2-days sequential (left eye was blurred 1 day before the right eye), bilateral visual loss. On examination, BCVA was 20/800 in the right eye and 20/400 in the left eye. Dilated fundus examination of both eyes revealed classic features of acute central retinal artery occlusion (CRAO), including diffuse retinal whitening, cotton wool spot, arteriolar narrowing, retinal hemorrhage, and a cherry-red spot at the fovea, more notable on the right eye.

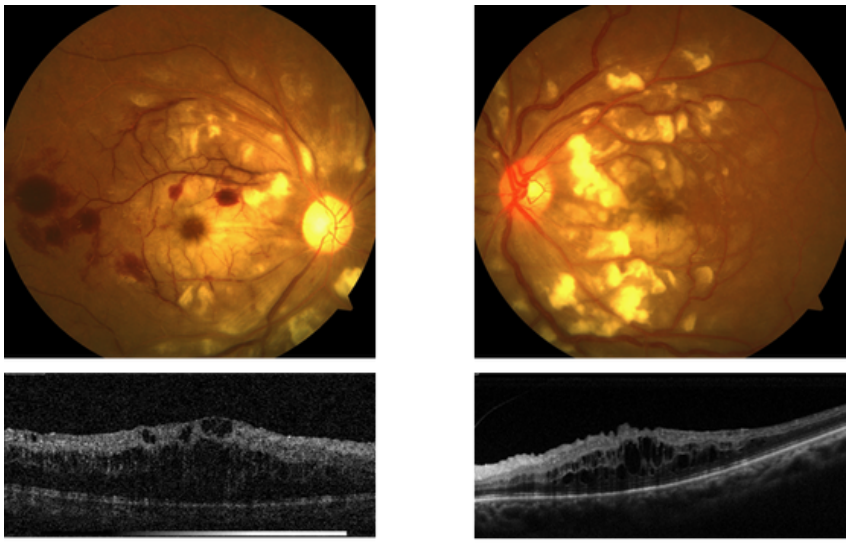

Figure 1. (upper images) Fundus photo of bilateral CRAO. Note the cherry red spot on the right eye is more profound than the left. Preretinal hemorrhages only seen on the right eye. (lower images) SD-OCT shows hyperreflective inner retina with macular edema.

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Case 2: Bilateral Purtscher-like retinopathy

A 32-year-old woman with high myopia of -7.00 Diopter, presented 20 days after visual symptoms (34 days after dengue diagnosis) with bilateral decreased vision. Best corrected VA was 20/60 in the right eye and 20/80 in the left eye. Fundus examination revealed bilateral multiple cotton-wool spots in a peripapillary Purtscher-like configuration, dot hemorrhages, tilted optic disc and tessellated fundi.

Anatomical asymmetry was demonstrated in SD-OCT: the right eye exhibited juxtafoveal outer plexiform and inner nuclear hyperreflectivity, mild IRF and some subretinal fluid, whereas the left eye demonstrated inner and outer retina layer atrophy. No treatment was given to this patient.

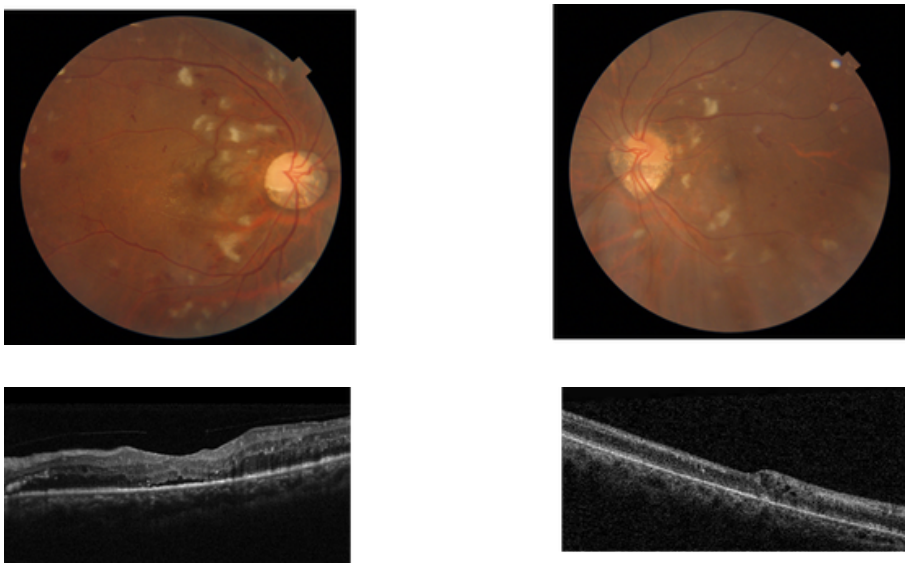

Figure 2. (upper images) Fundus photo of bilateral Purtscher-like retinopathy with multiple areas of retinal whitening (Purtscher flecken) with intraretinal hemorrhages confined to the posterior pole in both eyes. (lower images) SD-OCT shows hyperreflective inner retina with disorganization of retinal inner layers (DRIL) with ellipsoid zone disruption (lower left); central cyst and macular atrophy (lower right).

Case 3: Left Eye Paracentral Acute Middle Maculopathy (PAMM)

A 19-year-old female presented one day after visual symptom onset (8 days after dengue fever diagnosis) complaining of photopsia and a sudden paracentral scotoma in her left eye. BCVA was 20/20 in both eyes, but perimetry confirmed a localised paracentral visual field defect.

Fundus examination demonstrated a small, subtle grayish lesion superior to the macula just below the arcade. A localised hyperreflective band confined to the inner nuclear layer (INL) was revealed on SD-OCT, a diagnostic of PAMM. The lesion eventually subsided on its own without treatment.

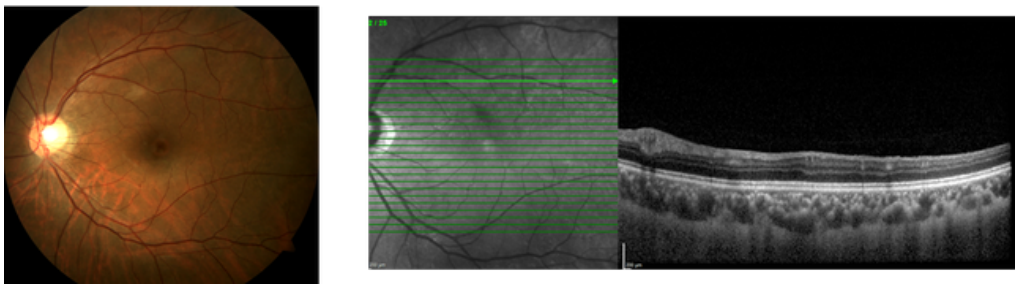

Figure 3. (left image) Fundus photo exhibit a focal grayish lesion superior to the macula. The SD-OCT scan on the lesion showed hyperreflective band limited to the INL layer (right image).

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Case 4: Right eye Superotemporal Branch Retinal Vein Occlusion

A 26-year-old female presented 15 days after visual symptom onset (26 days after diagnosis of dengue fever) with severe visual loss on her right eye. The affected eye has a vision of 20/400. Fundus evaluation of the right eye revealed superotemporal BRVO with sectoral retinal hemorrhages, cotton wool spots and slightly tortuous vessels. Cystoid macular edema was confirmed by SD-OCT, characterized by central intraretinal fluid and sliver of subfoveal subretinal fluid. Anti-vascular endothelial growth factor (anti-VEGF) was administered in view of the macular edema.

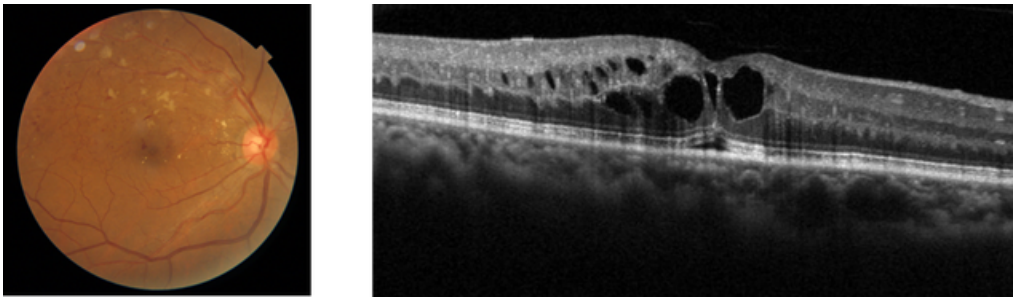

Figure 4. (left image) Fundus photo showed a superotemporal cluster of cotton-wool spot, blot hemorrhage, slightly tortuous retinal vessels, and exudates in the macular area. Cystoid macular edema was seen on SD-OCT, with disruption of ellipsoid band (right image).

Case 5: Left eye Inferotemporal Branch Retinal Vein Occlusion

A 29-year-old female presented three days after visual symptom onset (13 days post-dengue fever diagnosis) with left eye visual loss. Her BCVA in the left eye was 20/80. Inferotemporal BRVO was revealed on fundus examination, with cotton wool spots, sectoral flame-shaped hemorrhage, sclerosed inferior retinal artery and macular exudates. Macular edema identified on SD-OCT as hyporeflective intraretinal cyst/fluid and subretinal fluid, as well as hyperreflective inner retina. Injection of anti-VEGF was done to manage macular edema.

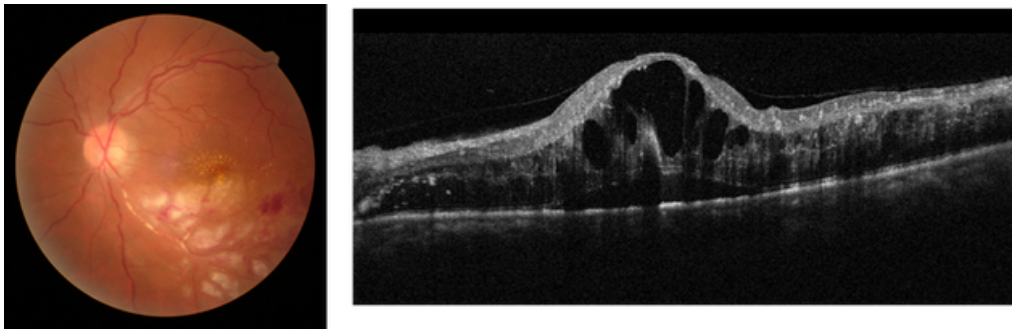

Figure 5. (left image) Fundus photo of inferotemporal branch retinal vein occlusion. Note the peculiar inferior sclerosed artery and sectoral dense cotton-wool spot. SD-OCT image confirmed the prescence of cystoid macular edema and multiple dots of hyperreflective foci (right image).

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Table 1. Patient Demographics, BCVA, Ocular Presentation, and Multimodal Imaging Findings

Case	Age / Sex	Affected Eye(s)	Interval from dengue diagnosis to visual complaint	Interval from visual complaint to presentation	Presenting BCVA (Affected)	Presenting BCVA (Fellow)	Principal Fundoscopic Signs	Key SD-OCT Findings
1	23 / F	Bilateral	7 days	2 days	20/800 RE	20/400 LE	Sequential bilateral retinal whitening, arteriolar narrowing, preretinal hemorrhage, and macular cherry-red spot.	Bilateral diffuse inner retinal layer hyperreflectivity and swelling (ischemia) with significant macular edema.
2	32 / F	Bilateral	14 days	20 days	20/60 RE	20/80 LE	Bilateral multiple cotton-wool spots in a peripapillary Purtscher-like configuration with microvascular ischemia and dot hemorrhage. Tesselated fundi.	Bilateral juxtafoveal outer plexiform and inner nuclear layer cystic spaces and diffuse retinal thickening on the right eye. Inner and outer retina layer atrophy on the left eye.
3	19 / F	Left Eye	7 days	1 day	20/20 RE	20/20 LE (scotoma)	Superior macula subtle grayish spot, inferior to the arcade. Normal-looking optic disc and peripheral retina bilaterally.	Left eye localized hyperreflective band confined to the inner nuclear layer (INL), diagnostic of PAMM; normal fellow eye.
4	26 / F	Right Eye	10 days	15 days	20/400 RE	20/20 LE	Right superotemporal branch retinal vein occlusion (ST-BRVO) with sectoral hemorrhages, cotton-wool spots, and slightly tortuous vessels.	Right eye severe cystoid macular edema (CME) with prominent intraretinal fluid, retinal thickening, and subretinal fluid.
5	29 / F	Left Eye	10 days	3 days	20/20 RE	20/80 LE	Left inferotemporal branch retinal vein occlusion (IT-BRVO) with sectoral hemorrhages and sclerosed artery.	Left eye cystoid macular thickening with intraretinal fluid directly correlating with visual impairment.

Across the series, OCT was uniformly useful both in confirming the level and pattern of retinal involvement (inner retinal versus outer/deep capillary plexus ischemia) and in objectively quantifying macular edema for longitudinal monitoring. No patient in this series had a systemic bleeding diathesis severe enough to preclude standard retinal evaluation, and management was individualised, ranging from observation to anti-inflammatory or anti-vascular endothelial growth factor therapy according to the specific occlusive pattern and visual threat.

Discussion

The broad spectrum of ocular dengue complications reflects a dual-pathway mechanism involving acute thrombocytopenia-related bleeding and delayed immunogenic inflammatory pathway.[1] The haemorrhagic pathway, driven by severe platelet depletion and transient coagulation alterations (prolonged PT and PTT), correlates with spontaneous ocular bleeding such as subconjunctival petechiae at platelet counts below 50.000/uL.[5,6] Conversely, occlusive and exudative posterior segment manifestations – such as retinal vasculitis, uveitis, macular edema, and capillary ischemia – are driven by host-immune mediated response rather than direct cryptopathic viral destruction.[6,7]

Our series highlight that dengue- associated microvascular injury produces occlusive disease across multiple vascular calibers and various retinal tissue depths – within eyes that otherwise lack conventional vasculopathic risk factors. All five patients in this series were young women with no systemic predisposition to retinal vascular occlusion, and all developed their ocular complication within the classically described window of one to three weeks following the onset of systemic dengue illness.[5,8]

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In the Landmark Eye Institute series, Chan et al established that visual symptom onset closely coincided with acute platelet trough, with 100% of patients experiencing visual complaints within 1 day at their lowest platelet count (mean: 6.8+- 0.8 days post fever; mean platelet nadir 42.8 +- 201 x 109/L.[3] Thrombocytopenia and the associated hemorrhagic diathesis can independently predispose to retinal hemorrhage.[3,9] In our cohort, the mean interval from systemic dengue fever to visual complaint was 9.6 days (range 7-14 days), with a presentation delay averaging 8.2 days (range 1-20 days). While cases 1 and 3 complaining of visual symptom 7 days post-dengue fever diagnosis (matching the acute nadir window), in case 2, 4, and 5 the ocular problem appear later into early convalescence phase (14 and 10 days after DF diagnosis, respectively).

This delay indicates that severe multi-caliber vascular occlusions are driven by delayed type III immune-complex hypersensitivity, complement activation (C3/C4 consumption), and cross-reactive anti-endothelial autoantibodies rather than transient platelet depletion alone.[4,6,7] It causes endothelial dysfunction with increased capillary permeability, and cytotoxic T-cell recognition of viral antigens within infected monocytes, each of which can precipitate capillary leakage, oedema, and downstream ischaemia of the superficial or deep retinal capillary plexuses.[3,9]

Bilateral CRAO in case 1 produced dense inner retinal hyperreflectivity and swelling possibly due to acute ischemic tissue death. CRAO is a rarer but more visually devastating manifestation, and to our knowledge remains scarcely reported in the dengue literature outside isolated case reports of branch retinal artery occlusion.[10] The bilateral, sequential nature of the event in this patient, together with the absence of any known embolic source or systemic vasculopathy, may be related to dengue-associated inflammatory, thrombotic, or endothelial dysfunction affecting more proximal and functionally critical retinal vessels.[6-10] In case 2, Purtscher's like retinopathy presented with peripapillary cotton wool spots and microvascular ischemia secondary to precapillary arteriolar occlusion. At presentation (34 days of dengue fever diagnosis) inner and outer neuroretinal atrophy in the left eye seen in SD-OCT, indicates either rapid, irreversible ischemic degeneration or pre-existing subclinical retina alterations.[11]

In case 3, PAMM manifested as localized hyperreflective band confined in the inner nuclear layer (INL), indicating selective ischemia of the intermediate capillary plexus (ICP). A close related entity, acute macular neuroretinopathy (AMN), has also been repeatedly described in association with dengue in the case-report literature, typically presenting with paracentral scotomas, wedge-shaped parafoveal lesions with their apex toward the fovea, and hyperreflectivity of the outer plexiform and outer nuclear layers with disruption of the ellipsoid zone and interdigitation zone, reflecting deep capillary plexus ischaemia rather than the more superficial pattern seen in PAMM.[9,12] Aggarwal et al demonstrate that deep microvascular voids and 'hairpin loop' capillary remodelling in PAMM and AMN persist for up to six months despite edema resolution, explaining persistent scotomas.[11]

Case 4 and 5 illustrate venous occlusive disease (superotemporal BRVO and inferotemporal BRVO) complicated by cystoid macular edema. In case 5, especially, fundus evaluation revealed a sclerosed artery alongside the venular occlusion, suggesting local inflammatory arteriolar vasculitis accompanying venous stagnation.[10,12] Retinal vein occlusion related to dengue has also been reported previously, typically occurring together with vasculitis sheating, retinal hemorrhage, and macular edema, and is thought to reflect an inflammatory or vasculitic phlebitis, consistent with fluorescein angiographic findings of vessel wall staining and leakage rather than simple luminal thrombosis.[13,14]

More broadly , retinal vasculitis and posterior uveitis are recognised as the dominant clinical phenotype of dengue eye disease in larger cohorts; in a series of 54 patients with dengue uveitis from a Singaporean tertiary referral center, retinal vasculitis was the most common finding (61.1%), followed by macular edema (49.1%), with nearly third of patients demonstrating both concurrently.[15]

Symptom-based screening may assist clinicians without immediate acess to ophthalmic review in identifying patients at risk of significant retinal vascular complications. Seet and colleagues, in a prospective cohort of 156 patients with confirmed dengue infection, found that leukopenia and hypoalbuminemia were independent predictors of clinically significant ocular symptoms. The triad of eye flashes, floaters, and blurring of vision carried a 100% positive predictive value of underlying retinal hemorrhage.[16] Vivian et al carries a systematic review and identify that blurred vision and scotoma are the most frequent symptoms.[8] While the study was not designed to validate such screening tool, it reinforces the case for counselling patients with dengue fever to seek prompt ophthalmic assessment for any new visual disturbance arising one to three weeks after systemic diagnosis.[16]

This series has several limitations inherent to its retrospective and descriptive design, including a small sample size, a lack of concurrent comparison group, and only describe the presenting condition without follow-up result of treatment. Additionally, due to the secondary-referral nature of our eye clinic, the initial diagnosis and acute management of systemic dengue fever occurred at external healthcare facilities prior to patient referral. Systemic laboratory parameters (platelet, leukocyte, and haematocrit counts, as well as coagulation profiles and were extracted secondarily from referral letters and discharge summaries rather than verified through real-time laboratory testing at the time of ophthalmic evaluation, hence we did not include the data into our series. Nonetheless, the consistency of the clinical pattern – young, otherwise healthy women developing occlusive retinal vascular disease within a well-defined temporal window following dengue infection – together with the concordance of our findings with the existing case-report and cohort literature, supports a genuine, if under-recognised, association between dengue infection and retinal vascular occlusion across multiple retinal vessel calibres and depths.

Conclusion

Dengue virus infection can precipitate a diverse, sight-threatening spectrum of retinal vascular occlusion, including CRAO, BRVO, or PAMM. These complications occur in young, healthy individuals lacking cardiovascular risk factors. High resolution SD-OCT is indispensable for diagnosis, anatomical localization, longitudinal monitoring and prognostic stratification. It should be performed liberally in any dengue patient presenting with new visual symptoms, even when clinical examination is unremarkable.

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Given the potential for irreversible visual loss, heightened awareness of this complication among both physicians managing systemic dengue and ophthalmologists is warranted. Dengue infection should be one of the differential diagnosis of otherwise unexplained RVO in patients with recent travel to endemic regions.

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