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Original Research Article

Posterior Segment Ophthalmic Complications in Dengue Infection – A Case Series

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Abstract:
We report 10 cases of posterior segment ophthalmic manifestations resulting from dengue infection in a tertiary care centre in South Kerala. We performed an observational case by case analysis of retinal complications in a series of 10 patients admitted as cases of dengue fever who presented with visual impairment. Ophthalmic evaluation included Snellen visual acuity testing, Indirect ophthalmoscopy, Fundus photography, OCT and Fundus fluorescein angiography. 15 eyes of 10 patients were affected. Mean age of patient was 41.2 years (15-51). Presenting visual acuity ranged from 6/9 to counting fingers. 9 out of 10 cases (90%) reported central impairment of vision. Onset of vision impairment coincided with the nadir of serum thrombocytopenia. Among the 15 eyes, retinal findings included maculopathy and retinitis (4 eyes), macular bleed and retinal haemorrhages (4 eyes) vasculitis and vascular occlusion (4 eyes), foveolitis (1 eye) and choroidal effusion (eye). 9 out of 10 cases recovered to their pre retinopathic visual acuity. These new retinal complications points towards a widened spectrum of posterior segment complications associated with dengue infection.
Keywords: Posterior Segment, Dengue Maculopathy, Retinitis, Choroidal Effusion, Vasculitis, Vascular Occlusion, Foveolitis.

Introduction

Dengue fever is a mosquito borne disease that is commonly found in the tropics [1,2]. Dengue virus belongs to the family *Flaviviridae*, and its members include the four antigenically-related serotypes of dengue virus (DENV 1–4). It is transmitted to humans by the bite of an infected female *Aedes* mosquito, usually the *Aedes aegypti* mosquito. Dengue infection is characterized by an acute onset of fever associated with headache, muscle ache, retro-orbital pain, joint pain, abdominal discomfort, and rashes. [3]. Dengue infection is usually a clinical diagnosis but can be confirmed with laboratory tests based on the time of presentation; frequently used tests include polymerase chain reaction (PCR), and immunoglobulin M (IgM) or immunoglobulin G (IgG) enzyme immunoassays. [10,11] Dengue is usually a self-limiting infection. Ophthalmic complications associated with DF and DHF have not been classically described. Within the ophthalmic community, this complication is being observed more frequently in recent times. However, only a few isolated case reports have been published [1,2,4,5]. These reports attribute ocular complications to the transient thrombocytopenia and resulting bleeding diathesis. The precise pathophysiologic mechanism of dengue ophthalmic complications is not well understood; however, many studies have alluded to the possibility of an immune-mediated process as a likely mechanism [10,11]. In this paper, we report a series of 10 patients who had ophthalmic symptoms after Dengue fever and the authors aim to analyse the various posterior segment ocular manifestations, and describe the course, spectrum of manifestations, and prognosis and treatment of these new and emergent complications.

Methods

We describe an observational case series of 10 patients with retinal manifestations following dengue infection for a period of 9 months from February 2022 to November 2022 in Ophthalmology department in a tertiary care centre in South Kerala. Diagnosis was made by a referring infectious disease physician on the basis of characteristic clinical signs and symptoms and confirmed on dengue polymerase chain reaction (PCR), dengue serology ([IgM] and IgG seroconversion). After the initial visual acuity testing by Snellen chart and anterior segment slit

lamp examination, posterior segment retinal examination were done with an indirect ophthalmoscopy. Retinal findings were documented with serial colour fundus photography and OCT scan of retina was done to analyse the extent of retinal damage. Patient follow up varied from 2 weeks to 3 months following the ocular diagnosis. During the follow up study, only necessitated cases underwent Fundus Fluorescein Angiography as it was an invasive procedure.

Results

15 eyes of 10 patients (6 males & 4 females) with ophthalmic symptoms who are diagnosed cases of dengue fever referred by physician to the department of ophthalmology were studied. Age group of patients ranged from 15 to 51 years with a mean age of 41.2 years. Out of the 15 eyes of 10 patients 5 cases had unilateral and 5 cases had bilateral involvement of posterior segment of eye (fig 1)

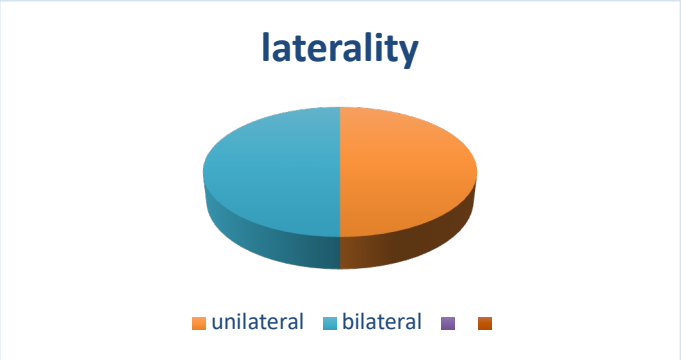

Figure 1: Laterality of cases

All 10 patients (100%)had ocular symptoms in some form or other. The onset of visual symptoms coincided with the nadir of thrombocytopenia and occurred within 24 -48 hours of lowest platelet count. The most common symptom was blurring of central vision which was encountered in 9 out of 10 patients (90%). Snellen visual acuity ranged from 6/9 to 1/60. (median 6/60). Symptom of central scotoma was seen only in 2 patients (20%). Ocular pain was said by 3 patients (30%) which was described by 2 of them as retrobulbar and 1 as diffuse ocular pain. 1 patient (10%) complained of floaters as seeing blackish red dots in front of the eye. Distribution of ocular symptoms are shown in fig 2.

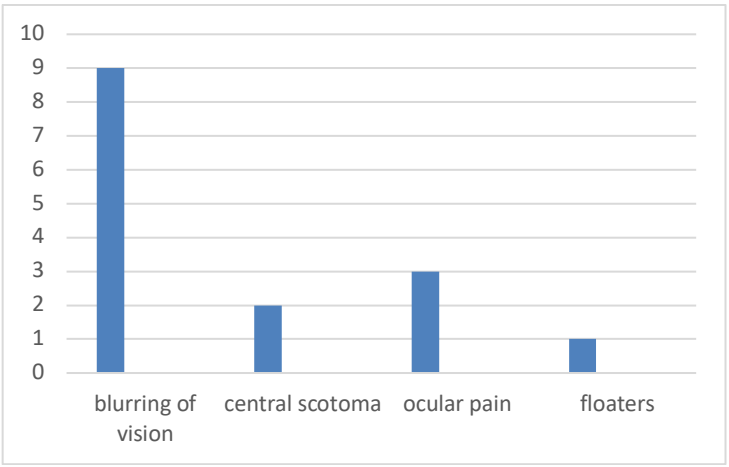

Figure 2: Distribution of ocular symptoms

Among the ocular signs the posterior segment manifestations were found on the macular region. Among the spectrum of retinal manifestations among the 10 patients, 15 eyes (75%) had ocular involvement retinitis with maculopathy, macular bleeding and haemorrhages were the majority encountered and noted in 8 eyes(53.3%).(fig 3,4,5)

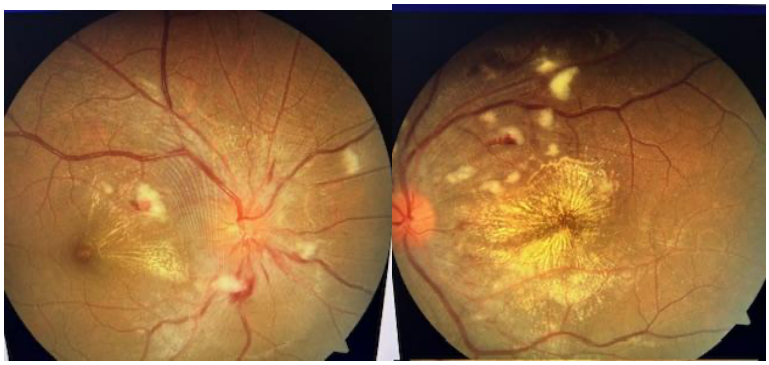

Figure 3: Bilateral Retinitis with maculopathy

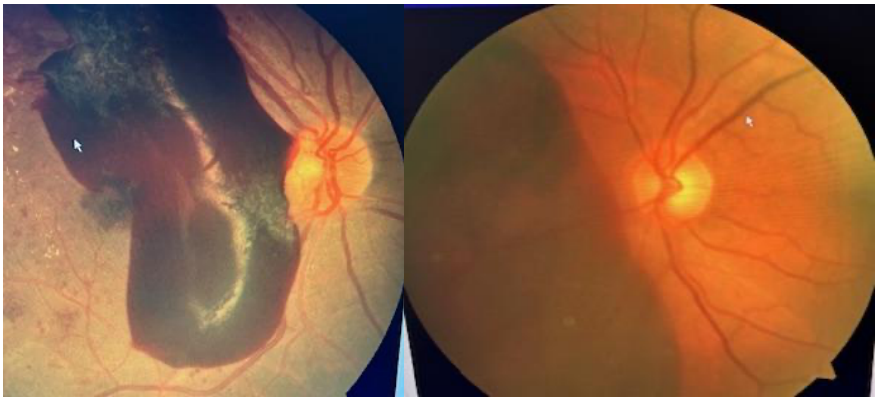

Figure 4: Fundus photographs of macular bleed

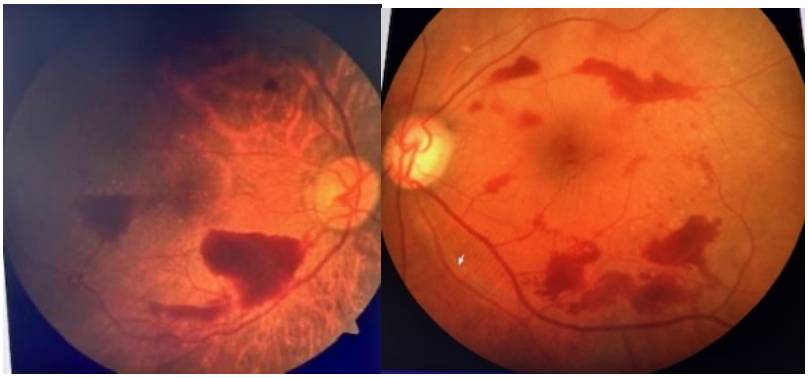

Figure 5: Bilateral retinal haemorrhages

Other retinal manifestations were features of vasculitis and vascular occlusion in 4 eyes (26.6%),(fig 6,7)

Figure 6: Fundus photograph of vasculitis

Figure 7: vascular occlusion

Figure 8: Fundus photograph of branch retinal venous occlusion and OCT scan of macula showing macular edema.

Other rare clinical presentations noted were choroidal effusion in 2 eyes (13.3%), (fig 10) foveolitis or acute macular neuroretinopathy in 1 eye (6.65%).

Figure 9: Fundus photograph of foveolitis showing ill-defined subretinal yellowish deposits at the fovea

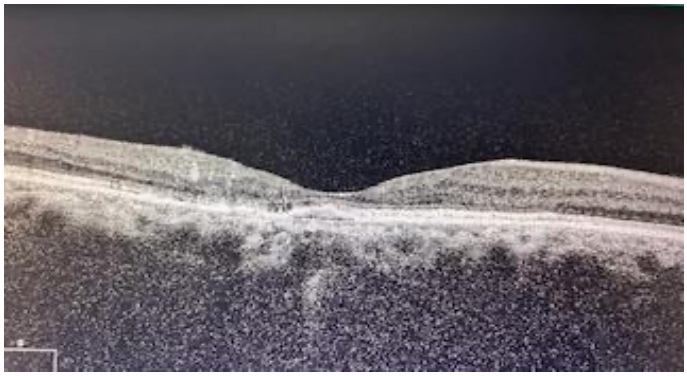

Figure 10: OCT scan of foveolitis (AMN) – focal disruption of outer neurosensory retina with preservation of foveal contour

The individual distribution of cases is shown in fig 11.

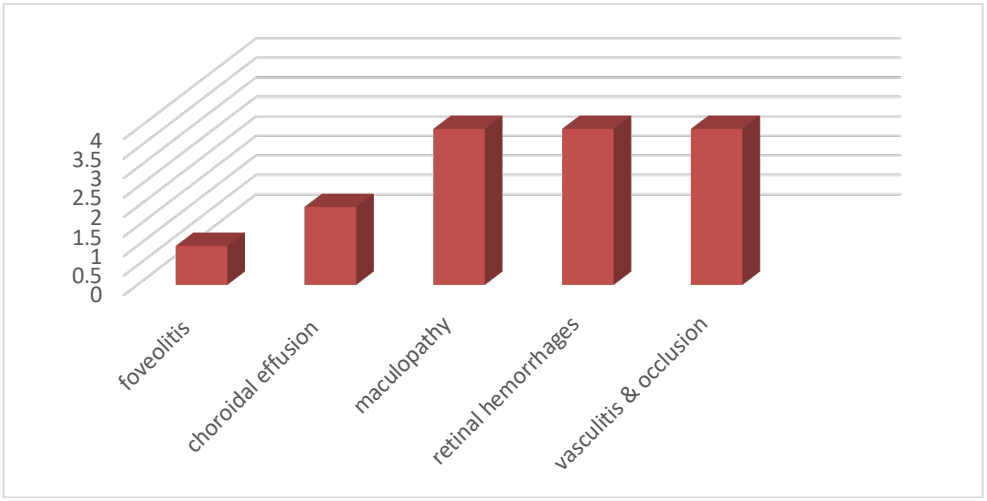

Figure 11: Distribution of posterior segment findings

Discussion

Among the 15 eyes of 10 patients who presented with ophthalmic symptoms following dengue fever, the spectrum of ophthalmic manifestations leads to the various pathophysiological mechanisms involved. Based on similar studies by Chan DP et al.[1], first and most obvious pathogenesis would be the thrombocytopenic state, with its resultant bleeding tendency, which gives rise to increased incidence of haemorrhage [2,3]. These hemorrhages manifest as retinal blot hemorrhages in the macula and retinal periphery and henceforth, manifests as blurring of vision [5,6]. The presence of vasculitis and macular edema suggest a hyperpermeable and inflammatory process [10,11]. It involves immune clearance by way of induction of cross-reaction between T-cells and recognition of dengue viral antigens which results in the release of cytokines with vasoactive and procoagulant properties. Ophthalmic complications can affect both anterior and posterior segment of the eye of which anterior segment constitute only 1-5% according study reports [1,2,5,7,8]. Hence the relevance of our study regarding the various posterior segment manifestations. In the series reported by Lim et al.[5] ocular complications were mainly confined to the posterior segment especially macula. Onset of ocular symptoms coincided with the nadir of thrombocytopenia [1.3]. Mean platelet count at time of ocular involvement ranged from 5000-75000/microlitre of blood. In our study the most common symptom encountered was blurring of vision which was present in all patients .This is in concurrence with similar studies conducted by Chan DP et al and other studies in Singapore [1,5,7]. As the complications are located at the macula in our series, it resulted in higher likelihood of awareness by the patient of visual impairment resulting from poor central vision. Central scotoma was reported by 2 patients which corresponded to the area of edema and hemorrhage in the macula [2,3]. Ocular pain which is the next common symptom manifested as retrobulbar in 2 patients and one reported as diffuse ocular pain. There were 8 out of 23 papers which reported ocular symptoms as ocular pain [2,3,4,5,7,8,10,11]. Next symptom was floaters due to retinal bleed which was noticed by the patient as seeing blackish red dots in front of the eye.

Ocular signs as maculopathy and retinitis Dengue-related maculopathy commonly presents with macular edema [10,11]. Our case series had 4 eyes out of 15 which presents as retinitis with

maculopathy. One series by Teoh et al.[10] further categorized the type of macular edema based on their appearance on OCT. Hemorrhages associated with dengue-related maculopathy are mostly intraretinal and can take the form of dot, blot, or flame-shaped hemorrhages. Macular hemorrhage was the second commonest presentation of dengue-related ocular sign, affecting 45 of 65 eyes (69.2%) in another case series of patients in Singapore [10,11]. Bilateral blot hemorrhages in the macula of four patients were the only ocular sign associated with dengue fever in the series by Chlebicki et al. Vasculitis and vascular occlusion were noted in 4 eyes. We had 1 case of branch retinal venous occlusion and 1 case of central retinal venous occlusion. Case series by Beral et al. and Sanjay et al. [11,12] described six patients (nine eyes) with vascular involvement causing severe impairment of vision .Other less common signs included choroidal effusion and foveolitis which are reported in three other studies [12,13].

Regarding the management 5 out of 10 patients were conservatively managed as spontaneous resolutions are expected and reported in similar studies [1,2,3]. Clinical signs resolved spontaneously and rapidly within 2 weeks of follow up. Steroids were the mainstay of management in persistent and symptomatic cases. Oral steroids alone in the form of prednisolone 1mg / kg / day were given in 1 patient with vasculitis and parenteral steroids as Inj IV Methylprednisolone 500 mg twice daily for 3 days followed by oral prednisolone in tapered doses were given in 2 patients with severe maculopathy and retinitis. 2 patients with vascular occlusion were managed with intravitreal AntiVegf Ranibizumab only after the platelet count incremented after a gap of 2 weeks of initial presentation due to the potential risk of vitreous bleed.

Outcome and prognosis – Visual recovery, in the form of improvement of signs and symptoms, usually corresponds to improving platelet levels but may take several weeks to reach a steady state [1,10]. One patient had defaulted follow up after 2 weeks as the vision had returned to normal. Remaining 9 had a recovery period between 7 days and 3 months .Resolution of clinical signs were followed by their visual acuity returning back to their pre retinopathic level was seen in 8 patients but mild symptoms in the form of reduced clarity and glare sensitivity were reported by patients. In one case of severe dengue maculopathy, though maculopathy was resolved and vision improved by steroids it couldn't reach the pre retinopathic normal levels due to the extensive damage of photoreceptors and inner retinal layers as evidenced in OCT scan. None of the patients reported adverse effects to steroids.

Conclusion

A myriad of ocular complications relate to dengue infection with most of them confined to the posterior pole of the fundus. The mechanism behind dengue infection and ocular involvement is unknown but related to pro coagulable state by thrombocytopenia and immune mediated inflammatory process. Ophthalmic complications are usually seen in young adults who often present at the nadir of thrombocytopenia. The prognosis for ophthalmic complications is good with improved visual acuity and resolution of ocular signs in most patients without any treatment. A proportion of patients with more severe ocular impairment require steroid treatment with most patients achieving reasonable improvement in vision and resolution of signs. Despite good recovery of vision and resolution of clinical signs in most patients, ophthalmologists and physicians should be aware and vigilant as isolated reports of cases of dengue ophthalmic complications with poor visual acuity refractory to treatment have been reported. A heightened awareness of dengue-related ophthalmic complications among clinicians involved in the care of patients with dengue would facilitate prompt referral for ophthalmologic assessment.

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Conflict of interest – none declared.

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