

## Culture-positive unilateral panophthalmitis in a serology-positive case of dengue hemorrhagic fever

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Dengue fever, a mosquito-borne disease commonly found in the tropics, is one of the most prevalent forms of Flavivirus infection in humans. Symptomatically, it is characterized by fever, arthralgia, headache, and rash. Ophthalmic manifestations can involve both the anterior and posterior segment. Panophthalmitis is rare in dengue hemorrhagic fever, and there is no report of culture-positive panophthalmitis in this setting. Here, we report a case of a serology-positive 33-year-old male patient of dengue hemorrhagic fever who developed sudden onset pain, redness, and proptosis in the right eye. The patient subsequently developed panophthalmitis in his right eye, and *Bacillus cereus* was isolated from eviscerated sample. This case provides unique insights into pathogenesis of panophthalmitis in dengue and highlights the management options.

**Key words:** *Bacillus cereus*, dengue, panophthalmitis

Dengue is a virus-borne infection endemic in South-East Asia, Central America, and South America, which is characterized

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by fever, arthralgia, headache, and rash.<sup>[1-4]</sup> Causative agents are *Flaviviridae* of four serotypes (DEN 1-4) that spread through mosquito vectors predominantly *Aedes aegypti* and *Aedes albopictus*.<sup>[5]</sup> Anterior segment manifestations include periorbital ecchymosis, subconjunctival hemorrhage, bilateral punctate corneal erosions, and anterior and intermediate uveitis.<sup>[6]</sup> Posterior segment manifestations include maculopathy, retinal vasculitis, retrobulbar hemorrhage, isolated peripheral hemorrhages, vitreous hemorrhage, subhyaloid hemorrhages, and Roth spots.<sup>[7]</sup> Panophthalmitis is a rare complication, which has been reported in only 2 cases in literature till date.<sup>[8,9]</sup> We report the first case of culture-positive unilateral panophthalmitis in a serology-positive patient of dengue hemorrhagic fever.

## Case Report

A 33-year-old male was brought to emergency room of a large multispecialty hospital in Eastern India with chief complaints of fever for 7 days associated with nausea, vomiting, and abdominal pain. The initial blood parameters on admission showed platelets to be 35,000/mm<sup>3</sup> and nonstructural protein 1 (NS1) IgG antigen to be positive suggesting a serological diagnosis of dengue fever. He was started on supportive therapy which included intravenous colloids, broad spectrum intravenous antibiotics, and platelet transfusions (4 units of 50 ml).

On the 3<sup>rd</sup> day of hospitalization, the patient developed pain, redness, and proptosis in the right eye for which ophthalmic opinion was sought from a tertiary eye care center in Eastern India. On bedside ophthalmic examination, the patient was partially conscious, not oriented to time, place, or person; hence, visual acuity and ocular movements could not be elicited. Right eye showed lid edema with conjunctival chemosis and congestion, corneal edema, exposure keratopathy inferiorly, and raised finger tension [Fig. 1a]. Anterior and posterior segments had no view due to corneal edema. The left eye was within normal

limits. The patient was started on intensive topical antibiotics along with broad-spectrum intravenous antibiotics (vancomycin, metronidazole, and meropenem) according to the internist discretion. Ophthalmic ultrasound facility was not available in that center. Magnetic resonance imaging brain with orbit showed multiple basal ganglia infarcts with hyperintensity and thickening of right ocular coats with hazy vitreous and periocular extension of the inflammation, which pointed toward the diagnosis of acute dengue encephalitis with panophthalmitis [Fig. 1c and d].

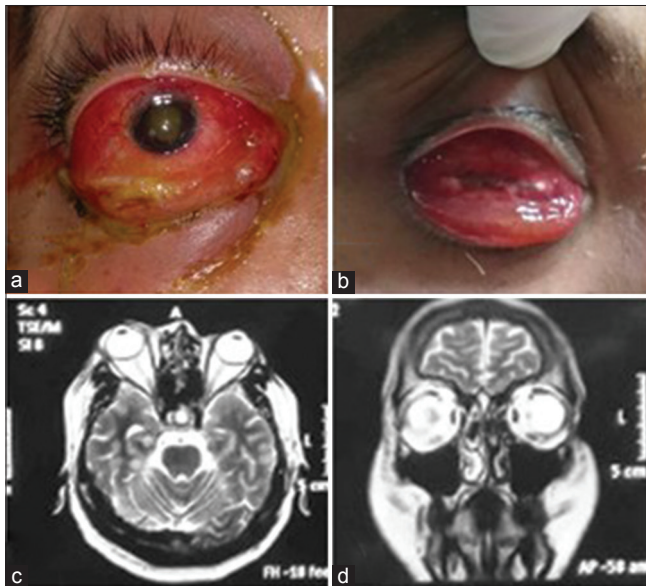
As there was no clinical improvement within next 24 h, the patient was advised and underwent evisceration of the right eye. Eviscerated sample was sent for Gram staining, KOH staining, bacterial culture, and fungal culture and was tested for dengue virus genome. The result of eviscerated sample came out to be positive for bacilli in clusters and culture showed growth of *Bacillus cereus*. The IgG blood serum was positive for dengue, but polymerase chain reaction (PCR) of the eviscerated sample was negative for dengue genome.

Postoperative period was uneventful with a healthy socket [Fig. 1b]. No complications of evisceration were noted. The systemic condition rapidly improved 1 week postoperative, with rise in platelet counts to 1.74 lakh/mm<sup>3</sup>.

## Discussion

Panophthalmitis is inflammation of all coats of eye including intraocular structures. Under normal circumstances, the blood ocular barrier provides a natural resistance against invading organisms. Destruction of intraocular tissues in panophthalmitis may be either due to direct spread of organism to the site of damage, or indirect invasion by the organism due to secondary infection, or from inflammatory mediators of the immune response. Panophthalmitis is a rare complication of dengue fever. The pathogenesis of panophthalmitis in dengue is not known. There are only 2 previous reported cases. Sriram *et al.* has reported a 25-year-old male with bilateral panophthalmitis in a serology-positive case of dengue fever where they isolated Gram-positive cocci from eye swab, but no growth on culture.<sup>[9]</sup> Saranappa and Sowbhagya reported a case of 6-year-old girl with serology-positive dengue who developed unilateral panophthalmitis with no microbiological isolate from ocular sample.<sup>[8]</sup> Neither of the cases had any microbiological isolation from the eviscerated sample.

Authors of both the cases attribute immunological response as the cause of panophthalmitis. In the present case, we tested the eviscerated sample along with serology of blood sample to detect if dengue virus was the cause for panophthalmitis, or it was secondary to other infection due to poor immunity and breaking of blood ocular barrier secondary to inflammation. The IgG blood serum was positive for dengue but PCR of eviscerated sample was negative for dengue genome. Culture of eviscerated sample was positive *B. cereus*. Dengue fever is a known cause of septicemia.<sup>[10]</sup> Antibodies against dengue virus NS1 have been observed to cross-react with endothelial cells resulting in disintegration of endothelial cells. This facilitates entry of bacteria into the bloodstream of patients with dengue. Studies have isolated dengue virus in human leukocytes and it is postulated that leukocyte infection could cause relative immunosuppression in patients with dengue leading to bacteremia. *B. cereus* is a known cause of endophthalmitis with very poor visual prognosis.<sup>[11]</sup> It also causes endogenous endophthalmitis.<sup>[12]</sup> *B. cereus* panophthalmitis in the setting



**Figure 1:** (a) Right eye showing lid edema with conjunctival chemosis and congestion, corneal edema, exposure keratopathy inferiorly and exudates in anterior chamber. (b) Postoperative period showing a healthy socket with sutures in situ. (c and d) Magnetic resonance imaging T2 sequence axial (c) and coronal (d) scan of brain with orbit showing multiple basal ganglia infarcts with hyperintensity and thickening of right ocular coats with periocular extension of the inflammation

of dengue hemorrhagic fever is unreported in published literature. This report established that it was not dengue virus *per se* that caused the panophthalmitis but a secondary infection by *B. cereus*. Plausible hypothesis is secondary endogenous endophthalmitis leading to panophthalmitis caused by dengue-induced septicemia. Microorganisms after crossing the blood ocular barrier enter the uveal tract or retinal circulation, lodge in small capillaries, and establish a septic focus in the retina that can later break into the vitreous. If a large septic embolus passes through the central retinal artery and disseminates throughout the retina, retinal necrosis and ischemia may occur thus allowing microorganisms to quickly invade the vitreous and further into anterior segment.<sup>[5]</sup> Patients with dengue who present with endophthalmitis or panophthalmitis should be aggressively managed, and samples (aqueous/vitreous or eviscerated material) should be subjected to standard microbiological tests to look for offending organisms and tailor therapy accordingly.

## Conclusion

We present a hitherto unreported case of culture-positive unilateral panophthalmitis in a patient with serology-positive dengue hemorrhagic fever. Ophthalmologists need to be aware of all the possible ocular complications in patients with such a scenario, be vigilant of sight-threatening complications and treat aggressively.

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## Conflicts of interest

There are no conflicts of interest.

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