**Scholars Journal of Medical Case Reports** **ISSN 2347-6559 (Online)**
Sch J Med Case Rep 2016; 4(8):626-628 **ISSN 2347-9507 (Print)**

(An International Publisher for Academic and Scientific Resources) DOI: 10.36347/sjmcr.2016.v04i08.019

# Unilateral Optic Neuritis Associated With Dengue Fever

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**Abstract:** The objective of this study is to report a case of unilateral optic neuritis associated with dengue fever. A 17-year-old Malay gentleman presented with sudden loss of vision in the right eye for the past 4 days. He had been experiencing high grade fever with chills for 4 days and had been clinically diagnosed with dengue fever. Ophthalmological examination revealed best corrected visual acuity of 3/60 in right eye and 6/6 in left eye. Pupillary examination revealed relative afferent pupillary defect (RAPD) on the right side. Rest of the anterior segment examination was unremarkable. Fundus examination of the right eye showed a hyperemic and swollen optic disc inferotemporally with macular striae. Blood investigations established the diagnosis of dengue fever (a positive dengue NS1 antigen) and a full blood count with a total white count of 3.7 and platelet of 94. A diagnosis of optic neuritis secondary to dengue fever was established. He was started on Bactrim II/II BD to cover for infectious causes of neuroretinitis. After a 2-month follow up, the clinical picture resolved, with improved visual acuity of 6/9 in right eye. Optic neuritis can occur in association with dengue fever with good spontaneous visual outcome.
**Keywords:** Dengue fever, optic neuritis.

## INTRODUCTION

Dengue fever (DF) and dengue hemorrhagic fever (DHF) are emerging diseases that are endemic in the tropical and subtropical regions of the world. The disease is caused by 4 serotypes of dengue virus of the genus Flavivirus transmitted generally by Aedes aegypti. Dengue fever is the most prevalent form of flavivirus infection in humans. The highest incidence occurs in Southeast Asia, India and the American tropics [1,2]. The number of reported dengue fever (DF) and dengue hemorrhagic fever (DHF) cases in Malaysia shows an increasing trend. The incidence rate also shows an upward trend from 44.3 cases/100, 000 populations in 1999 to 181 cases/100,000 populations in 2007 [3]. Ocular manifestations of dengue fever (DF) are uncommon and may include subconjunctival hemorrhage, retinal hemorrhage, cotton wool spot, retinal edema, retinal vasculitis or even rarer optic neuropathy [4].

## CASE REPORT

A 17-year-old Malay gentleman presented with sudden loss of vision in the right eye for the past 4 days. He had been experiencing high grade fever with chills, vomiting, cough and runny nose for 4 days and had been clinically diagnosed with dengue fever. He had no past history of ocular trauma or ocular surgery and his past medical history was unremarkable. Ophthalmological examination revealed best corrected visual acuity of 3/60 in right eye and 6/6 in left eye with and intraocular pressure of 14mmHg bilaterally. Pupillary examination revealed relative afferent pupillary defect (RAPD) on the right side with reduced sensitivity to light brightness of 20% and to red desaturation of 0%. Rest of the anterior segment examination was unremarkable in both eyes. Fundus examination of the right eye showed a hyperemic and swollen optic disc inferotemporally and macular striae [Figure 1 and Figure 2]. The left eye fundus was normal. Investigations established the diagnosis of dengue fever (a positive dengue NS1 antigen) and a full blood count which showed a total white count of 3.7, hemoglobin of 14.0, hematocrit of 44.9 and platelet of 94. A diagnosis of optic neuritis secondary to dengue fever was established. He was started on Bactrim II/II BD to cover for infectious causes of neuroretinitis. After a 2-month follow up, the clinical picture resolved, with improved visual acuity of 6/9 in right eye.

**Fig-1: Hyperemic and swollen optic disc with macular striae**

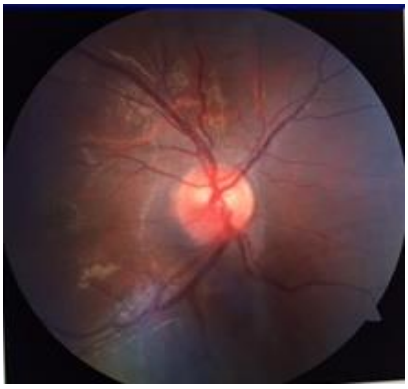

**Fig-2: Hyperemic and swollen optic disc**

## DISCUSSION

Dengue is the most common mosquito borne viral disease in humans. In recent years, it has become a major international public health concern. Globally, 2.5 billion people live in areas where dengue viruses can be transmitted [1-2]. Although rare, DF is known to be associated with a variety of ophthalmic manifestations. The onset of visual symptoms closely correlated with the lowest value of thrombocytopenia associated with DF. The pathogenesis for ophthalmic complications in dengue fever is unclear. The most common ophthalmic complications include subconjunctival hemorrhage, focal chorioretinitis with or without macular edema and retinal blot hemorrhages. Optic neuropathy associated with DF is extremely rare and three previously published reports are summarized in Table 1 [5-7]. Optic neuropathy associated with DF is often bilateral. All three previously reported cases had bilateral involvement [5-7]. To our knowledge, this is one of the few reported isolated cases of unilateral optic neuritis associated with a dengue viral infection. The cause for the optic neuropathy has been unknown. There is evidence of optic neuritis being immunogenic in origin [8] and therefore the treatment with steroid is justified. Inflammatory changes in the vascular endothelium resulting in vascular leakage, hemorrhage and ischemia can be seen in the cells infected with the dengue virus. Infection of cells with dengue virus has been postulated to cause a shift in balance of the cell-mediated immunity from Th1 and Th2 resulting in CD4/CD8 inversion and release proinflammatory mediators including IFNɤ and tumour necrosis factor (TNF) that can directly affect vascular endothelial cell apoptosis resulting in increased permeability. Autoantibodies against endothelial cells and platelets as a result of increased interleukin (IL)-6 production or molecular mimicry against dengue virus structural proteins have also been reported. However, raised cytokine levels and autoantibodies alone cannot explain the manifestations seen as this is also a feature in many infective diseases that do not result in increased vascular permeability [9-10]. Visual recovery, in the form of improvement of sign and symptoms, usually corresponds to improving platelet levels but may take several weeks to reach a steady state.

**Table-1: Summary of published reports of dengue fever associated optic neuropathy**

| Author(s) | Age (years) | Sex | Visual acuity at initial presentation | Fundus findings | Intervention | Follow up | Vision at final follow-up |
|---|---|---|---|---|---|---|---|
| Wen *et al.* [5] | Not reported | Not reported | Perception of light in both eyes | Disc edema in both eyes | High-dose steroids | Not reported | 6/12 both eyes |
| Haritoglou *et al.* [6] | 25 | Female | 20/500 in both eyes | Exudative maculopathy, small hemorrhages in both eyes | No treatment | 8 weeks | 6/60 right eye; 6/9 left eye |
| Preechawat and Poonyathalang [7] | 20 | Male | Counting fingers in both eyes | Disc hyperemia in both eyes; flame shaped hemorrhage at fovea in right eye | Intravenous methylprednisolone 250mg four times per day for 3 days followed by oral prednisolone 60mg/day tapered over 4 weeks | 18 months | 6/6 both eyes |

## CONCLUSION

In conclusion, DF and DHF can cause ophthalmic symptoms that were not previously well-described in the medical literature. Sudden loss of vision associated with optic disc edema and macular star exudate is denominated neuroretinitis and practically all neuroretinitis cases are of infectious origin. Our report has added another rare diagnostic possibility when neuroretinitis appears in an individual diagnosed with dengue viral infection in dengue

endemic region. Blurring of vision reported in this case coincides with the nadir of thrombocytopenia. Prognosis is generally good as the disease is often self limiting, resolving spontaneously even without treatment. With increasing epidemicity and co-circulation of multiple dengue serotypes, the occurrence of DF and DHF is set to rise. A heightened awareness of dengue-related ophthalmic complications among clinicians involved in the care of dengue patients would facilitate prompt referral for ophthalmologic assessment and management.

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