

# Sub-Inner Limiting Membrane Hemorrhage Secondary to Dengue Fever Treated With Nd:YAG Laser Hyaloidotomy

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## Abstract

**Purpose:** To report a patient with a sub-inner limiting membrane (ILM) hemorrhage secondary to dengue fever treated with neodymium:YAG (Nd:YAG) laser hyaloidotomy. **Methods:** A single case was evaluated. **Results:** A 41-year-old man presented with sudden vision loss in the left eye 10 days after being diagnosed with dengue fever. Funduscopy showed a sub-ILM macular hemorrhage in the left eye. Out of concern for retinal toxicity and to quickly restore visual acuity (VA), an Nd:YAG laser hyaloidotomy was performed. One month after the procedure, the logMAR VA in the left eye improved from 0.1 to 1.0 with complete resolution of the hemorrhage. **Conclusions:** Given the substantial increase in cases of dengue fever and its possible ophthalmologic involvement, this case highlights the importance of an ophthalmologic examination with funduscopy in patients with a sub-ILM hemorrhage and the possibility of treatment with an Nd:YAG laser.

## Keywords

sub-ILM hemorrhage, Nd:YAG laser treatment, hyaloidotomy, dengue fever

## Introduction

Dengue fever is considered a public health concern worldwide.<sup>1</sup> Ocular findings occur in up to 10% of hospitalized patients; however, the presence of thrombocytopenia is associated with a higher risk for retinal hemorrhages.<sup>2,3</sup> It is known that a sub-inner limiting membrane (ILM) hemorrhage can cause retinal toxicity, and treatment can include observation, pars plana vitrectomy (PPV), pneumatic displacement, or neodymium:YAG (Nd:YAG) laser hyaloidotomy.<sup>4,5</sup> We report a case of a 41-year-old man with a sub-ILM macular hemorrhage secondary to dengue fever treated with an Nd:YAG laser hyaloidotomy with complete resolution of the hemorrhage and recovery of visual acuity (VA).

## Case Report

A 41-year-old man presented with sudden vision loss in the left eye 10 days after being diagnosed with dengue fever. He was admitted to the hospital with malaise, hyporexia, and gingival bleeding. A hemogram showed anemia (hemoglobin 8.1 g/dL) and severe thrombocytopenia (platelets 17 000 mm<sup>3</sup>). Given these findings, the patient received 2 units of packed red blood cells and 8 units of platelet concentrates. An ophthalmologic examination found the logMAR best-corrected visual acuity (BCVA) to be 1.0 OD and 0.1 OS. Funduscopy of the right eye was unremarkable, and a sub-ILM macular hemorrhage

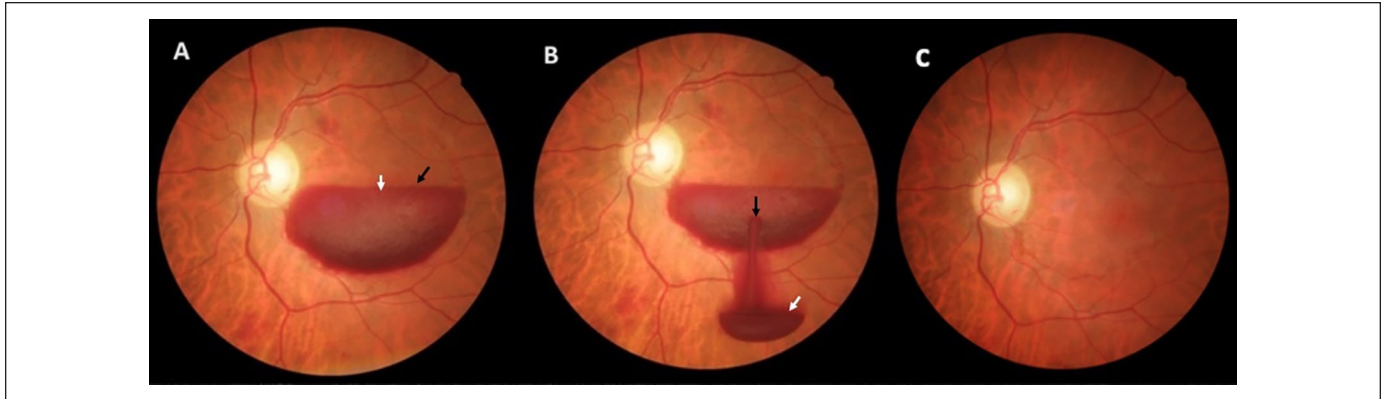
was seen in the left eye (Figure 1A), which was confirmed on spectral-domain optical coherence tomography (OCT) B-scan (Figure 2A). There were no other abnormalities in the ophthalmologic examination.

For personal reasons, the patient returned after 30 days with no improvement in the ophthalmologic condition. The therapeutic options were presented, and an Nd:YAG laser hyaloidotomy was chosen, mainly given the concerns for retinal toxicity and the impossibility of performing a vitrectomy in the next few days. In addition, the patient was gainfully employed and was worried about returning to work; thus, a rapid recovery was needed. After the risks of the procedure were thoroughly explained to the patient, an Nd:YAG laser hyaloidotomy was performed. Two adjacent laser spots with a selected energy of 1.5 mJ and total energy of 3 mJ created an opening in the ILM, enabling drainage of the hemorrhage (Figure 1B). One month after the procedure, the BCVA in the left eye was 1.0 logMAR with complete resolution of the hemorrhage (Figure 1C and Figure 2B).

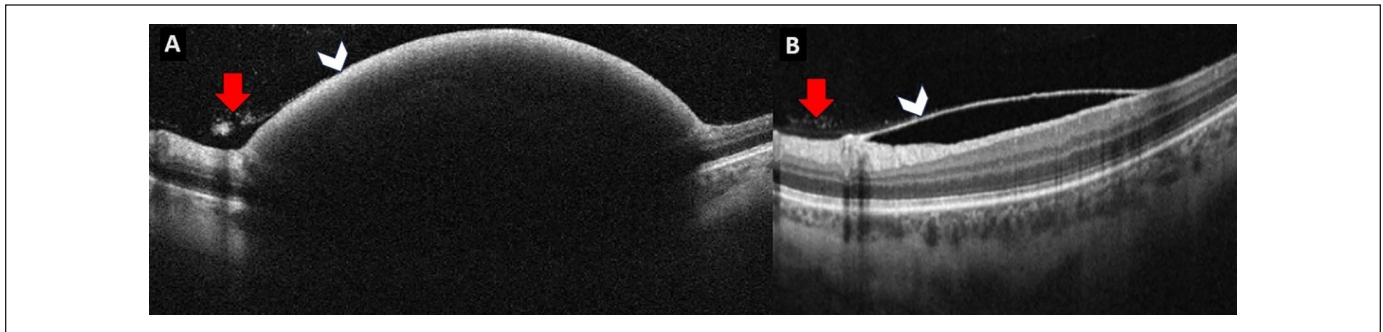
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**Figure 1.** (A) Fundus photograph shows a sub-inner limiting membrane macular hemorrhage in the left eye (black arrow). Note the foveal involvement (white arrow). (B) The drainage process immediately after neodymium:YAG laser hyaloidotomy (black arrow). Note fresh blood migrating and filling a vitreous cyst (white arrow). (C) One month after the procedure, the hemorrhage had completely resolved.



**Figure 2.** (A) Spectral domain-optical coherence tomography (SD-OCT) B-scan shows the blood under the inner limiting membrane (ILM) (white arrowhead). Note the posterior hyaloid (red arrow) fused with the ILM over the hemorrhage. (B) SD-OCT B-scan 1 month after neodymium:YAG laser hyaloidotomy shows a thick ILM (white arrowhead) with a residual space between the ILM and the retinal nerve fiber layer. Note the posterior hyaloid (red arrow) still fused with the ILM. (Color figures available online.)

## Conclusions

Dengue fever is considered a public health concern worldwide, with an estimated 50 to 100 million cases per year in tropical regions.<sup>1</sup> Ocular findings are rare and include vascular occlusions, maculopathy, uveitis, and subconjunctival, preretinal, or retrolental hemorrhaging.<sup>6</sup>

Although the pathophysiology remains uncertain, it is postulated that eye involvement may be immune-mediated in cases of uveitis, secondary to vasculopathy in cases of maculopathy, and secondary to thrombocytopenia in cases of retinal hemorrhage.<sup>2</sup> Thrombocytopenia in dengue fever is multifactorial and occurs mainly as a result of decreased bone marrow cell production associated with an increase in the destruction of peripheral platelets. In addition, crosslinked antibodies and viral proteins against platelets, endothelial cells, and coagulation molecules can cause platelet dysfunction, endothelial cell damage, coagulation defects, and macrophage activation, resulting in a hemorrhage. In addition, the dengue virus nonstructural protein 1 and elevated serum hyaluronan levels have recently been implicated in the vascular leakage in dengue fever.

The occurrence of a retinal hemorrhage appears to be even more prevalent when thrombocytopenia is associated with anemia, as in the current case.<sup>7-9</sup> Among preretinal hemorrhages, a sub-ILM hemorrhage can appear very similar to a subhyaloid hemorrhage on funduscopy, and OCT is often used to differentiate between the types of hemorrhages.<sup>10</sup> On OCT, the ILM usually appears as a highly reflective line, while the posterior hyaloid appears as an overlying patchy membrane with low optical reflectivity, which helps localize the anatomic region of the hemorrhage.<sup>11</sup> In addition, OCT can show the amount of residual hemorrhage, which is often difficult to define on funduscopy.<sup>10</sup>

Sub-ILM hemorrhages usually present with sudden visual loss when the macular region is involved. They can result from the Valsalva maneuver being performed, trauma, a subarachnoid hemorrhage, and hematologic diseases, among other causes. The spontaneous reabsorption of blood in sub-ILM hemorrhage cases can take a long time, and because there is a possibility of retinal toxicity resulting from the degradation of hemoglobin products, early treatment is needed.<sup>5</sup>

Treatment options for a sub-ILM hemorrhage include observation, pneumatic displacement, Nd:YAG laser hyaloidotomy,

and PPV. The choice of treatment should be individualized and based on several factors, such as the extent of the hemorrhage, bilaterality, risks, patient concerns, an associated vitreous hemorrhage, and the need for quick visual recovery. Pneumatic displacement can be performed when rapid recovery is required and when the hemorrhage size is less than 3 disc diameters. In these cases, an Nd:YAG laser hyaloidotomy may be unsafe. The indications for PPV to treat a hemorrhage secondary to dengue fever are not well established; however, in cases of fundus-obscuring hemorrhages, it may be considered early. In addition, the availability of surgical retina setups must be taken into consideration when choosing surgical management.<sup>12,13</sup>

Alternatively, an Nd:YAG laser hyaloidotomy can be performed, with energy ranging from 1 to 11 mJ. Early and late complications from this procedure can occur, such as worsening of the hemorrhage, macular hole (MH) formation, retinal tears, and retinal pigment epithelium and choroidal injury.<sup>11</sup> Special attention should be paid to myopic patients or those who have peripheral retinal degeneration. In a retrospective review of 21 eyes treated with an Nd:YAG laser for a premacular subhyaloid hemorrhage, Ulbig et al<sup>14</sup> reported 1 case of an MH and 1 case of rhegmatogenous retinal detachment after treatment. Studies have shown high success rates, including 93.33% in a group of 30 eyes, 100% in a group of 12 eyes, and 84.7% in a group of 14 eyes.<sup>15–17</sup> Therefore, Nd:YAG laser treatment should be considered in selected cases for monocular patients or for patients whose job requires bilateral VA. There was no evidence of complications in the current case.

Furthermore, in our case, there was significant concern for retinal toxicity given that the patient returned after 30 days without improvement in the ophthalmologic condition. Also, the patient wished to have quick visual recovery; therefore, an Nd:YAG laser hyaloidotomy was chosen.

Given the substantial increase in dengue fever cases and its possible ophthalmologic involvement, this case report highlights the importance of an ophthalmologic examination with funduscopy in these patients and the possibility of treatment with an Nd:YAG laser in cases of a sub-ILM hemorrhage. Further studies are needed to create an ophthalmologic screening protocol for patients diagnosed with dengue fever, especially when it is associated with thrombocytopenia.

### Ethical Approval

This study was conducted in accordance with the Declaration of Helsinki.

### Statement of Informed Consent

The patient provided informed consent, including permission for publication of all photographs and images included herein.

### Declaration of Conflicting Interest

None of the other authors declared potential conflicts of interest with respect to the research, authorship, and/or publication of the article.

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