The benefits of Nd:YAG hyaloidotomy in the management of subhyaloid retinal hemorrhage

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Abstract

Neodymium-doped yttrium aluminum garnet (Nd:YAG) laser hyaloidotomy is a noninvasive outpatient procedure in which the posterior hyaloid face is punctured and the opening enables the drainage of subhyaloid hemorrhage into the vitreous. The aim of the study was to advocate for timely intervention and quick visual restoration for patients with subhyaloid retinal hemorrhage, especially when patients present early. We report two cases of successful management of subhyaloid retinal hemorrhage using Nd:YAG laser hyaloidotomy, without any complications. The first patient was a primiparous woman who experienced spontaneous nasal bleeding during pregnancy, while the second patient had subhyaloid retinal hemorrhage secondary to ocular trauma. Nd:YAG laser hyaloidotomy is a relatively safe, office-based procedure that ensures faster visual recovery in patients with subhyaloid retinal hemorrhage.

Keywords: Subhyaloid retinal hemorrhage, Nd:YAG laser hyaloidotomy, Pregnancy- induced subhyaloid hemorrhage Post traumatic subhyaloid hemorrhage

INTRODUCTION

Subhyaloid hemorrhage may be idiopathic but is commonly associated with Valsalva maneuver, which can result from a sudden high shout, excessive coughing, vomiting, hyperemesis gravidarum, pregnancy, strained vaginal labor, and lifting heavy objects. Other causes of subhyaloid hemorrhage include rupture of retinal macroaneurysm, retinal vein occlusion, proliferative diabetic retinopathy, blunt ocular trauma, Terson syndrome, shaken baby syndrome, acute childhood leukemia, and other blood dyscrasias.^[1-4] Rare cases of subhyaloid hemorrhage in patients with falciparum malaria and Devic's disease have also been reported.^[5,6] Hence, there is a need for a thorough investigation to rule out vascular disorders and other possible risk factors to enable appropriate management.

Neodymium-doped yttrium aluminum garnet (Nd:YAG) laser hyaloidotomy is one of the available treatment modalities for subhyaloid retinal hemorrhage with the advantage of quick visual rehabilitation compared to conservative management. In conservative management, visual recovery occurs in a slow, frustrating, and incapacitating manner, often lasting several weeks to months.^[7,8]

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Subhyaloid hemorrhage resolves spontaneously, though it may take several weeks to months. It rarely results in permanent visual loss; however, in some instances, long-standing large hemorrhages may cause toxic damage to the retina from prolonged contact with hemoglobin and iron.^[7] Subhyaloid hemorrhage is usually drained with the use of Nd:YAG laser hyaloidotomy. The timing of such intervention is crucial, because the blood should still be in a fluid state to allow drainage by gravity. Drainage by gravity is also achieved by targeting the inferior or dependent position for the hyaloidotomy. However, not all subhyaloid hemorrhages are drained with the use of Nd:YAG laser hyaloidotomy; this procedure is reserved for hemorrhages that are larger than or equal to three disc diameters in size.^[8]

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It has been observed that large hemorrhages have a protective effect on the retina during Nd:YAG laser hyaloidotomy by preventing laser-induced damage to the retina, which is due to the photodisruptive nature of the laser.^[8]

CASE REPORT 1

A 24-year-old primiparous woman presented to our facility in April 2023 with a 4-month history of sudden, painless reduction in vision in the left eye. There was no antecedent history of trauma. Her hemoglobin genotype was AA, she was neither hypertensive nor diabetic, and there was no history of chronic cough. However, it is noteworthy that she had a history of spontaneous nasal bleeds at 7 months gestational age, at about the same time she noticed the poor vision, which became worse after spontaneous vertex delivery 2 months later. There was no other history suggestive of bleeding tendencies. The spontaneous nasal bleeds, however, resolved without any intervention after childbirth and have not recurred since.

At presentation, the best corrected visual acuity was 6/4 in the right eye and 6/36 in the left eye. The near acuity was N5 in the right eye and N24 in the left eye. Intraocular pressures were 13 mm Hg in the right eye and 5 mm Hg in the left eye. Anterior segment examination in both eyes and funduscopy in the right eye were normal. Funduscopy of the left eye showed a subhyaloid hemorrhage; 5 disc diameters in size. An assessment of pregnancy-induced left subhyaloid hemorrhage was made, and she had a fundus photograph of the left eye [Figure 1] and an optical coherence tomography [Figure 2], both of which revealed a large subhyaloid hemorrhage in the left eye.



Figure 1: Photographs of the right and left fundus showing left subhyaloid hemorrhage.



Figure 2: Optical coherence tomography of the left macula area showing subhyaloid hemorrhage.



Figure 3: Photograph of the left fundus 3 days after Nd:YAG hyaloidotomy showing vitreous hemorrhage.

She underwent Nd:YAG laser hyaloidotomy within 1 week of presentation. The Nd:YAG was administered using Lightmed Laser Model LIGHTLAS SLT Deux-V, with a duration and spot size of 4 ns and 8 μ m, respectively. She received 36 shots at 1 to 11 mJ (with a total energy of 282 mJ). The central part of Opticlear Madhu two-mirror goniolens was used. The hemorrhage was punctured at the dependent position to allow drainage into the vitreous. She was asked to maintain a head-up position and was commenced on topical and systemic steroids after the procedure.

During the postoperative review on the third day, the visual acuity in the left eye had improved to 6/6, the intraocular pressure in the left eye was 10 mm Hg, and funduscopy showed vitreous hemorrhage in the left eye [Figure 3]. The right eye was normal. She was advised to continue with her medications, and a 2-month follow-up appointment was scheduled.

Case Report 2

A 27-year-old female community health extension worker presented to our facility in September 2023 with a 2-day

history of sudden, painless reduction in vision in the right eye with associated frontal headache and dizziness. This was preceded by trauma to the right eye 1 month before the onset of poor vision. Her hemoglobin genotype was AA, and she was neither a known hypertensive nor a known diabetic.

At presentation, the best-corrected visual acuity was counting fingers in the right eye and 6/5 in the left eye. The intraocular pressure in each eye was 12 mm Hg. The anterior segment was normal in both eyes. Funduscopy of the right eye showed hazy media with a subhyaloid hemorrhage of about 6 disc diameters in size [Figure 4]. The left fundus was normal.

An assessment of right subhyaloid hemorrhage was made, and a fundus photograph of the right eye showed a subhyaloid hemorrhage measuring 6 disc diameters horizontally.

She had right Nd:YAG laser hyaloidotomy performed with the Lightmed Laser Model LIGHTLAS SLT Deux-V, using 10 shots at 7 mJ (total energy was 70 mJ); the duration and spot size were fixed at 4 ns and 8 μ m, respectively. An Ocular Instrument Mainster focal/grid laser lens was used. Postprocedure medications included topical and systemic steroids.

By the second week postoperatively, the visual acuity had improved to 6/18, and the fundus showed a resolving vitreous hemorrhage. She was asked to continue her medications, and a 2-month follow-up appointment was scheduled.

DISCUSSION

Nd:YAG laser hyaloidotomy was first introduced by Faulborn for the drainage of central subhyaloid hemorrhage. It has since successfully achieved the rapid resolution of subhyaloid hemorrhage, with eventual quick recovery of vision. This is demonstrated in the cases reported, with no complications recorded in both patients. The advantage of Nd:YAG laser hyaloidotomy over conventional conservative management, in which the patients are observed for spontaneous resolution of the blood to occur without intervention, is the rapid restoration of visual acuity.^[7,8] Prompt Nd:YAG laser hyaloidotomy also



Figure 4: Photograph of the right and the left fundus showing subhyaloid hemorrhage in the right fundus.

allows a better view of retinal pathologies that may need intervention as well as the treatment of the primary cause of the subhyaloid hemorrhage if identifiable.

The patients we reported had rapid visual recovery as the visual acuity improved from 6/36 to 6/6 within 3 days and from counting fingers to 6/18 within 2 weeks, respectively after Nd:YAG laser hyaloidotomy. This is similar to the findings of Murtaza *et al.*,^[8] who reported a case series in which the duration of complete restoration of visual acuity ranged between 6 and 23 days. Similarly, a 16-year-old boy with traumatic subhyaloid hemorrhage reported by Alarfaj *et al.*^[7] demonstrated complete resolution of vitreous hemorrhage and visual recovery to 6/6 within 20 days of intervention (Nd:YAG laser hyaloidotomy).

Conversely, Akanbi et al.^[9] in Lagos reported a case series in which three patients were managed conservatively for 3 to 4 weeks. Two out of the three patients had subsequent intervention due to lack of improvement in ocular symptoms, while only one patient was successfully managed by observation. In the same vein, a case series by Babalola et al.^[10] in Ibadan showed improvement in visual acuity after 3 months of conservative management in one of the three patients reported. The remaining two patients were lost to follow-up. Rennie et al.^[4] also observed four patients who were managed conservatively; three out of the four patients had resolution of the hemorrhage over 3 to 6 months. This demonstrates the fact that conservative management keeps patients in a state of poor vision for a longer time, and these patients may eventually need surgical intervention.

None of our patients had complications following the Nd: YAG hyaloidotomy, similar to other studies.^[11] However, rare possible complications that have been reported include persistent vitreous hemorrhage, failed drainage, metamorphopsia, macular hole, retinal breaks, and retinal detachment.^[2,12] This further emphasizes that Nd:YAG laser hyaloidotomy is safe and well tolerated by patients.

LIMITATION

Other causes of subhyaloid hemorrhage were not ruled out in these patients. A limited number of investigations, including genotype and random blood sugar tests, were carried out.

CONCLUSION

Nd:YAG laser hyaloidotomy is advocated for subhyaloid hemorrhage because it is a safe, noninvasive office-based procedure that restores vision faster than other modalities of management.

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Conflict of Interest

Not applicable.

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