

MACULAR HOLE FORMATION ASSOCIATED WITH INTENSE PULSED LIGHT THERAPY

Nenita Maganti, BS, Neil S. Kalbag, MD, Manjot K. Gill, MD

Purpose: To describe the first case of macular hole formation following intense pulsed light therapy.

Methods: This is a retrospective case report. A 68-year-old woman presented with blurry vision that occurred 1 day following intense pulsed light therapy for hair removal.

Results: A full thickness macular hole, which had not been previously documented was noted on fundus exam. Ocular coherence tomography confirmed a full-thickness macular hole.

Discussion: Laser treatment for hair removal has been reported to cause ocular injuries including iris atrophy, pupillary distortion, cataracts, and uveitis. Intense pulsed light therapy, a specific type of laser therapy, has been reported to cause iris transillumination defects, anterior uveitis, and pupil abnormalities. Our case is the first to describe a macular hole secondary to intense pulsed light therapy. The etiology of the macular hole is postulated to be secondary to possible thermal injury with absorption of energy at the level of the retinal pigment epithelium. This emphasizes the role and importance of preventative measures, such as protective glasses in reducing the risk of ocular injuries.

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From the Department of Ophthalmology, Northwestern University Feinberg School of Medicine, Chicago, IL

Nonsurgical cosmetic procedures have been on the rise and have reached 11 million in 2016, a 15-fold increase from 1997.¹ Laser hair removal comprised one million of such procedures and was among the top five nonsurgical procedures in 2016.¹ Laser hair removal through photothermolysis can be performed using ruby, alexandrite, diode, or neodymium:yttrium aluminum garnet (Nd:YAG) lasers and intense pulsed light (IPL). Intense pulsed light is

a high-intensity light source that uses broad wavelengths of light for treatment of pigmentary and vascular lesions for hair removal and skin resurfacing. The iris, being a pigmented structure, is susceptible to the wavelength used in IPL. Iris atrophy, inflammation, and pupillary distortion are known complications of IPL therapy.²

Full thickness macular hole (FTMH) formation as a complication of amplified coherent laser sources has been described in the literature;³ however, a macular hole secondary to IPL has not yet been reported. Here, we present a case of a macular hole associated with IPL therapy for hair removal.

Case Report

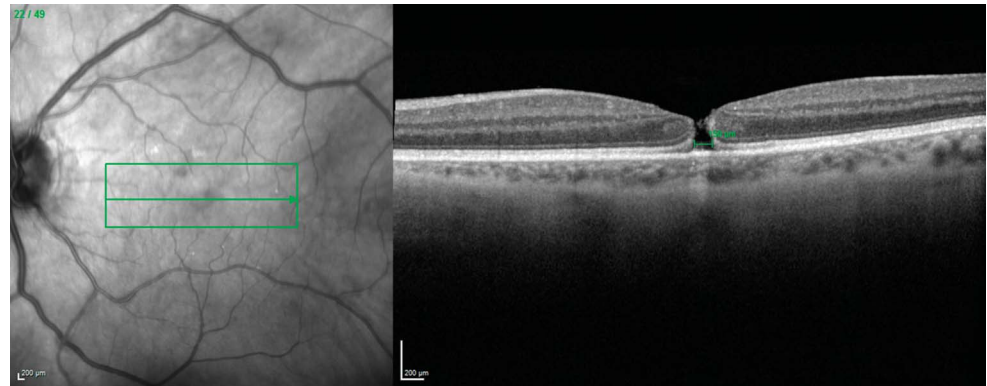
A 68-year-old woman with history of high myopia and trace cataracts in both eyes presented to the comprehensive clinic with a 6-day history of blurry vision and a yellow central spot in her left eye. The symptoms had started 1 day after an IPL treatment for hair removal on her chin. The patient reported she had looked at the IPL probe when a demonstrative test spot was performed on her left arm. She reported not wearing protective goggles at the time of the test spot, but was wearing protection

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Reprint requests: Manjot K. Gill, MD, Department of Ophthalmology, Northwestern University Feinberg School of Medicine, 645 North Michigan Avenue, Suite 440 Chicago, IL 60611; e-mail: mgill@nm.org

Fig. 1. Ocular coherence tomography of left eye showing the FTMH (150 μm) at presentation, with hyper-reflectivity at the base of the hole and RPE transmission defect.



at the time of laser treatment on her chin. Her best-corrected visual acuity was 20/20 in her right eye, and 20/30- in her left. Best-corrected visual acuity on previous exams was 20/20 in both eyes. Intraocular pressure was normal. Examination of the vitreous revealed a posterior vitreous detachment that had been first documented 2 years before presentation. On fundus exam, an FTMH was observed in her left eye. Her fundus exam 8 months before was documented as normal. An ocular coherence tomography (OCT) of her left eye confirmed an FTMH measuring 150 μm (Figure 1) with a retinal pigment epithelium (RPE) transmission defect at the center of the hole. Fundus autofluorescence also showed a hyperautofluorescent area in the fovea (Figure 2). She was referred on to the retina service.

Upon her initial presentation to the retina service 4 weeks later, best-corrected visual acuity was 20/50 + 2 in her left eye. Fundus exam and OCT showed a slightly larger FTMH (313 μm) and persistent RPE transmission defect. Pars plana vitrectomy was discussed with the patient; however, she elected to defer immediate surgery.

At the 8-week visit, she continued to complain of deteriorating vision. Best-corrected visual acuity decreased to 20/60-2.

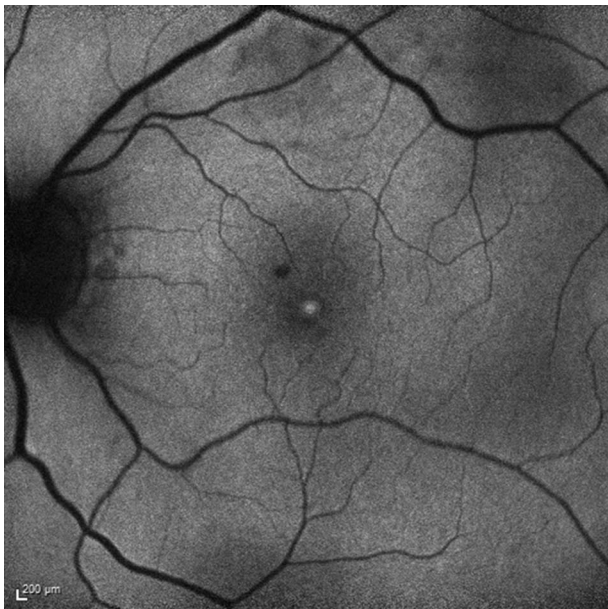


Fig. 2. Fundus autofluorescence of left eye at presentation revealing a hyperautofluorescent area in the fovea.

Her fundus exam and OCT showed a persistent FTMH (477 μm) (Figure 3). At this point she elected to proceed with surgery.

The following week she underwent pars plana vitrectomy, internal limiting membrane peeling, and 20% SF₆ gas injection in her left eye without complication. At the most recent 2-month post-op visit, her visual acuity had improved to 20/30 in her left eye. Examination and OCT revealed a closed macular hole with a small subfoveal elevation and subtle ellipsoid zone disruption and a smaller, but persistent RPE transmission defect (Figure 4).

Discussion

Ophthalmic lasers such as the femtosecond, excimer, and Nd:YAG are widely used in ophthalmology and it is well documented that these lasers can cause ocular complications including corneal perforation, intraocular hemorrhage, and macular edema.⁴ They have also been reported to cause retinal injuries such as retinal detachment, macular hole, and retinal burn.⁴ Lasers are also widely used outside the field of ophthalmology for cosmetic treatments⁵; laser hair removal is one of the most common cosmetic procedure in the US with one million procedures reported in 2016.¹ Cosmetic laser treatment on any facial structures, particularly in the eyelid and periocular regions, has potential for ocular complications. Iris atrophy, cataracts, and uveitis have been noted with the diode and alexandrite lasers.⁶ Retinal injuries such as retinal laser burn and vitreous hemorrhage have also been noted with the Q-switched Nd:YAG laser during cosmetic procedures.⁷ Balyen recently reported a case of unilateral maculopathy following alexandrite laser epilation, highlighting the undesired consequences of procedures performed by untrained personnel and the psychological and social effects caused by vision impairment.⁸

Intense pulsed light therapy uses a broad wavelength of light ranging from 500 to 1200 nm.

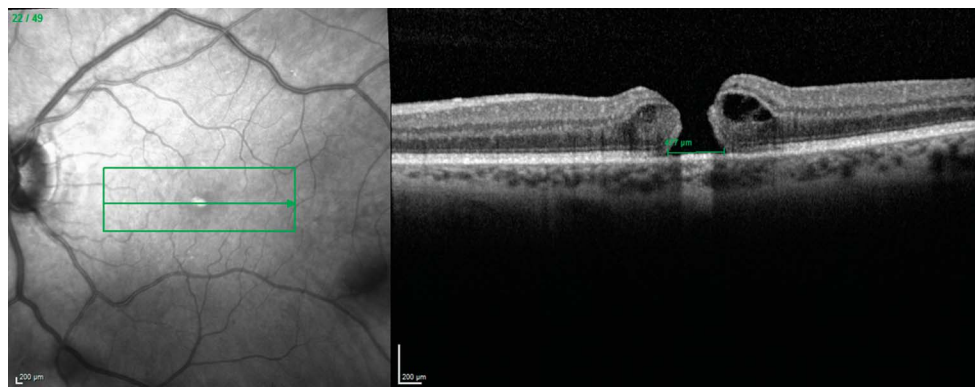


Fig. 3. Preoperative OCT of left eye showing a large FTMH (477 μm) at 8-week follow up visit.

Pigmented ocular structures such as the iris absorb wavelengths emitted by the IPL.⁹ Cases of ocular complications due to IPL are limited to the anterior segment including iris transillumination defects, anterior uveitis, and pupil abnormalities.^{2,9} To our knowledge this is the first case of a posterior segment complication of macular hole occurring following IPL treatment.

Macular holes secondary to ophthalmic lasers such as Nd:YAG and argon laser have been reported; the Nd:YAG laser causes a photodisruption on the retina and can also lead to mechanical traction on the vitreous, ultimately inducing a macular hole.⁴ In addition, tangential forces secondary to retinal thinning from thermal damage, seen in argon laser photocoagulation have also been postulated as a mechanism of macular hole formation.⁴ Lasers that use longer wavelengths penetrate deeper into the skin and have the potential to cause severe injuries.² Given that the central portion of the macula is extremely thin and comprises mostly of bare RPE, we believe that the melanin in the macular RPE could have absorbed the light from the laser causing damage to the macula. The presence of hyperreflectivity at the base of the hole with a persistent RPE transmission defect on OCT even after closure of the hole supports this

theory; because this is frequently seen following inadvertent laser injuries to the retina.¹⁰ The lack of protective eye wear during the demonstrative treatment, the patient’s history of looking at the flash of light during the test patch on the arm, and her immediate development of symptoms after the treatment support the theory of macular hole formation following inadvertent exposure to the IPL laser.

Preventative measures, such as protective glasses are critical in reducing the risk of ocular injuries and are the standard of care for IPL therapy. Several case reports have presented ocular injuries including cataracts, uveitis, retinal burns, corneal and iris defects related to cosmetic lasers, and a common feature in many of such reports was lack of eye protection.⁶ Opaque metal eyeglasses or wavelength-specific glasses, including lateral protection are standard of care for facial lasers treatment.^{6,9} For more sensitive areas such as the periorbital region, metal ocular shields are also recommended.^{6,9} It is crucial that professionals provide patients with eye protection before the start of any laser therapy (including the test patch) and counsel patients regarding the potential for ocular injury. Providers should be on the alert for ocular complications including macular hole formation following inadvertent exposure.

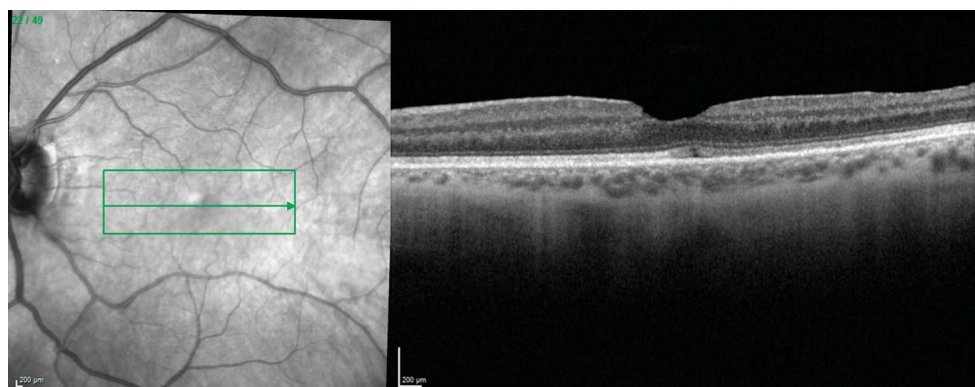


Fig. 4. Postoperative OCT of left eye showing a closed macular hole 2 months s/p pars plana vitrectomy with a small persistent transillumination defect.

Key words: intense pulsed light, macular hole, ocular coherence tomography.

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