

Laser-induced maculopathy after iris depigmentation cosmetic treatment

A cosmetic procedure that changes the colour of the eyes using laser therapy against iris melanosomes is being performed in several countries around the world. Some ophthalmologists have expressed concern about this procedure potentially causing glaucoma or uveitis.¹ Exposure to laser radiation also may cause visual impairment by retinal injury, sometimes resulting in irreversible damage to the patient.² We present the first case of a light-induced maculopathy in a patient who underwent an iris depigmentation laser treatment for electively changing the colour of her eyes.

A 30-year-old female with a history of breast and lips augmentation procedures presented to our emergency department with an acute-onset visual loss in her right eye for 12 days. She denied any history of systemic diseases, allergies, or toxic habits. She had undergone several laser sessions for iris depigmentation, the last of which matched the debut of symptom. Best-corrected Snellen visual acuity was 20/100 in the right eye and 20/20 in the left eye. The slit lamp showed a whitish atrophic appearance of the iris in both eyes (Fig. 1), while funduscopy of the right eye revealed a golden ring-shaped image affecting the fovea (Fig. 2A). This finding was highlighted by spectral-domain optical coherence tomography, which showed subfoveal disorganization of the outer retinal layers with hyperreflective material and discontinuation of the external limiting membrane and ellipsoid zone (Fig. 2B). The rest of the clinical examination added no further information.

We decided to follow a conservative approach with systemic corticosteroids (40 mg/day prednisone) and topic non-steroidal anti-inflammatory drugs (diclofenac, 1 mg/mL, 1 drop every 6 hours). In addition, a systemic study to rule out any underlying disease and a close follow-up were performed.

In the following weeks, the visual acuity of the right eye did not improve, so the treatments were removed progressively. The systemic study was normal, and the imaging tests remained stable.

One year later, the best-corrected visual acuity continued to be the same. The hyperreflective material disappeared, but the outer retinal layers stayed severely damaged, presenting with a small hypopigmented lesion in the fovea on funduscopy (Fig. 2C, D). In the last examination, almost 2 years after exposure, the optical coherence tomography findings persisted (Fig. 2E, F), but the best-corrected visual acuity improved to 20/30.

Achieving the desired cosmetic appearance is becoming more important every day. The medical aesthetic industry is growing exponentially in the health care field to cope with high standards and demands, including changing the colour of the eyes. Accordingly, many cosmetic treatments have emerged in an attempt to meet patient preferences for eye colour. These include coloured contact lenses as a temporary solution and other permanent techniques such as keratopigmentation or coloured intraocular diaphragms to cover the iris.³ Our patient underwent a different technique consisting of laser therapy for depigmenting the iris.

Eye colour is determined by the amount of pigmentation of the iris. More accurately, normal eye colours are the result of different volumes of melanin pigment granules in the superficial stroma of the iris. Brown eyes have more melanin than light-coloured eyes. Cosmetic laser treatment for iris depigmentation works by trying to change this genetically acquired feature by selectively attacking melanosomes inside iris stromal cells.⁴ For this reason, this technique is irreversible and can only turn dark eyes into lighter ones and not the other way around. Moreover, melanin-rich structures such as retinal pigment epithelium also can absorb laser energy, which increases the risk of retinal injury and blindness.² Definitely, we hypothesize that our patient probably developed laser-induced damage to the macula after undergoing this procedure.

Laser-induced maculopathy is typically a unilateral condition that includes outer retinal disruption, macular holes, epiretinal membrane, macular edema, or foveal hemorrhages.² The mechanism for retinal damage is by photocoagulation or photodisruption and depends on the duration, power, and wavelength of the laser. Unfortunately, there is

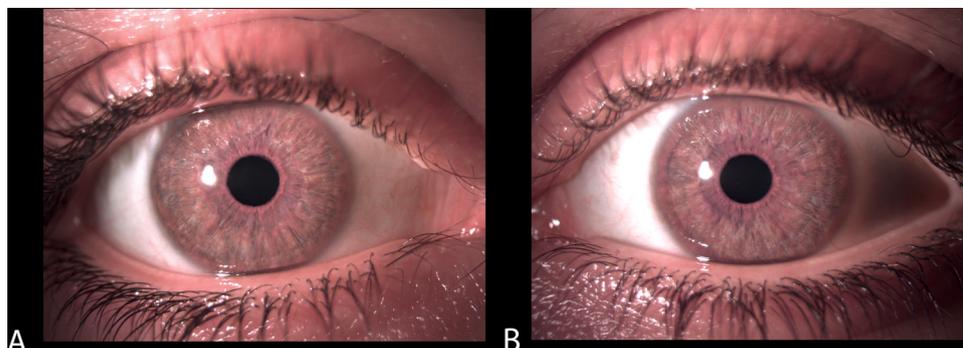


Fig. 1—Slit-lamp examination of both eyes showing a whitish appearance after undergoing cosmetic laser treatment.

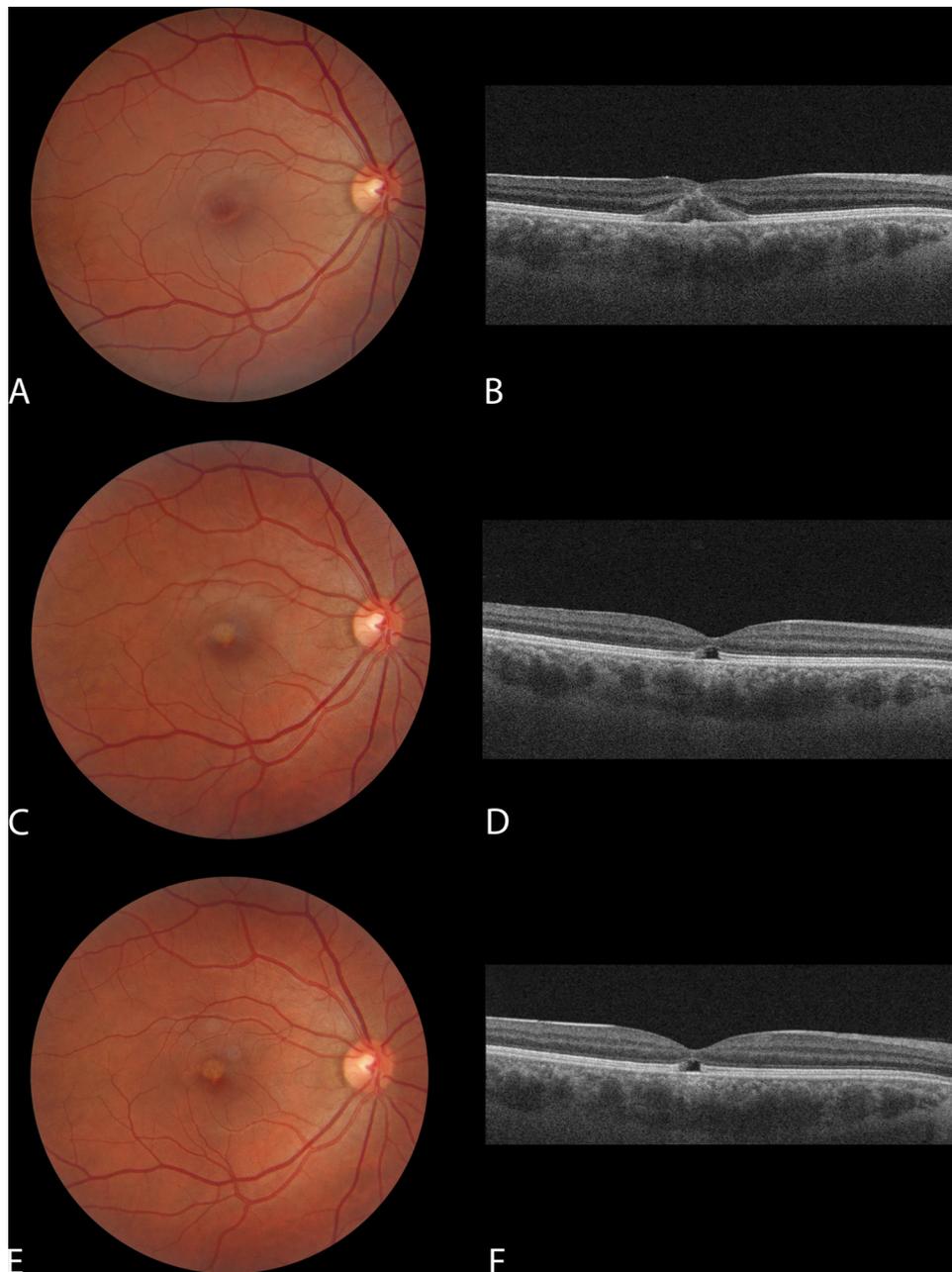


Fig. 2—Fundoscopy and optical coherence tomography of the right eye at presentation, after one year of follow-up and two years after exposure. (A) Fundoscopy of the right eye showing a golden ring lesion affecting the fovea at presentation. (B) Optical coherence tomography scan of the fovea reveals a hyperreflective deposit and discontinuation of the outer retinal layers. (C) Fundoscopy of the right eye showing a round atrophic lesion affecting the fovea 1 year after exposure. (D) optical coherence tomography macular scan of the right eye 1 year later confirms the persistent foveolar outer retinal atrophy. (E) Fundoscopy of the right eye showed no changes from the previous year appointment. (F) optical coherence tomography macular scan of the right eye looking stable after 2 years of follow-up.

no effective treatment for this disorder, although several case reports have demonstrated visual improvement after treatment with oral corticosteroids and recovery after several months or years.⁵ We followed a systemic treatment with oral corticosteroids in our patient, but the visual acuity did not improve until 2 years after exposure. However, we cannot guarantee that this improvement is related to the use of steroids because we cannot prove it. This fact should be evaluated in future studies.

To the best of our knowledge, this is the first case report of a severe maculopathy in a healthy patient after undergoing a cosmetic laser procedure involving the iris. Use of a laser for this cosmetic purpose remains neither detailed in terms of parameters, tested for safety risks, or supported by scientific publications. Our objective is to show the potential danger that patients may face when undergoing this type of therapy.

Ana Flores-Márquez,* Juan Ángel Moreno-Gutiérrez,*
Ana Chinchurreta-Capote,* Fernando García-Martín,*
Carlos Rocha-de-Lossada^{†,‡,§}

*Hospital Costa del Sol, Marbella, Spain; [†]Hospital Virgen de las Nieves, Granada, Spain. [‡]Department of Surgery, Division of Ophthalmology. Faculty of Medicine, University of Sevilla, Sevilla, Spain. [§]Department of Ophthalmology, Qvision, Vithas, Almería, Spain.

Originally received Mar. 8, 2022. Final revision Apr. 22, 2022. Accepted May. 31, 2022.

Correspondence to Ana Flores Márquez, MD;
anafloresmarquez94@gmail.com.

References

1. Dang S. Laser surgery to change eye color untested for safety risks [Internet]. American Academy of Ophthalmology. 2015. Available from: <https://www.aao.org/eye-health/news/laser-surgery-to-change-eye-color>. Accessed April 7, 2015.
2. Chen YY, Lu N, Li JP, Yu J, Wang L. Early treatment for laser-induced maculopathy. *Chin Med J (Eng)* 2017;130:2121–2.
3. Alió JL, Rodríguez AE, El Bahrawy M, Angelov A, Zein G. Keratopigmentation to change the apparent color of the human eye: a novel indication for corneal tattooing. *Cornea* 2016;35:431–7.
4. Yildirim Y, Duzgun E, Kar T, et al. Evaluation of color-changing effect and complications after Nd: YAG laser application on iris surface. *Med Sci Monit* 2016;22:107–14.
5. Kazi NA, Madhu Kumar R, Kanakamedala A, Jaya Madhuri G, Simakurthy S. Laser device induced retinopathy: an uncommon and under-reported public health issue. *Int J Sci Res (Ahmedabad)* 2021;10:923–5.

Footnotes and Disclosure

The authors have no proprietary or commercial interest in any materials discussed in this correspondence.