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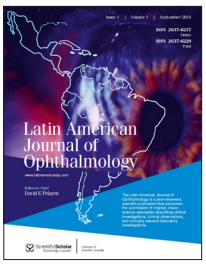

Case Report *Retina*

Complete visual recovery after an inadvertent foveal burn

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Received : 24 January 2023
Accepted : 09 May 2023
Published : 26 May 2023

DOI
10.25259/LAJO_4_2023

Quick Response Code:

ABSTRACT

We want to describe a case of inadvertent foveal burn during retinal laser in a patient with proliferative diabetic retinopathy (PDR). We report a 50-year-old male with PDR whose pattern scanning laser (Pascal®) procedure was complicated by an accidental foveal burn. On initial evaluation, the best-corrected visual acuity of the affected eye was 20/40. Fundoscopy revealed multiple laser burns in the macula, one of which crossed the fovea. The optical coherence tomography (OCT) showed an inadvertent burn at the foveal region and multiple parafoveal laser spots with the disrupted corresponding external limiting membrane (ELM), ellipsoid (EZ), and interdigitation zones. The patient underwent serial follow-up examinations. Six months after laser therapy, vision significantly recovered and improved to 20/20 in the affected eye. The results of follow-up OCT imaging showed that the ELM defect had fully recovered and the EZ defect had become smaller, as an unexpected and rare outcome. As a rare and interesting condition, laser burns around the foveal region seem to have the chance of retinal recovery over time. However, in most of the similar conditions, these accidental foveal laser burns lead to permanent severe visual impairment. Therefore, well-trained physicians must do retinal laser procedures.

Keywords: Foveal burn, Panretinal laser photocoagulation, Pattern scanning laser

INTRODUCTION

Panretinal laser photocoagulation (PRP) is the gold standard treatment of proliferative diabetic retinopathy (PDR). Among its visual complications is the permanent damage of retinal structures, such as an inadvertent foveal burn, which is by far the most common visual complication.[1,2] In this paper, we present a case of an accidental foveal burn during retinal laser treatment with remarkable recovery over time.

CASE REPORT

A 50-year-old male with a 10-year history of poorly controlled Type 2 diabetes mellitus (DM) was referred for ocular examination. On Snellen testing, his best-corrected visual acuity (BCVA) was 20/20 in both eyes. In addition, he had signs of neovascularization of the disc and elsewhere in both eyes without any macular edema on examination and baseline optical coherence tomography (OCT) imaging. Thus, Pattern Scanning Laser (Pascal®) photocoagulation (Light Las TruScan, Lightmed, San Clemente, CA, USA) was performed for both eyes using 3 × 3 array patterns, with 600 mW power, 400 μm spot size, yellow wavelength, and 10 ms duration. The patient complained of decreased visual acuity and metamorphopsia of the left eye immediately

after PRP. On examination, the BCVA was 20/20 in the right eye and 20/40 in the left eye (by Snellen E letter chart, at a distance of 6 m). The Amsler Grid examination revealed metamorphopsia with a central scotoma [Figure 1]. Fundoscopy revealed multiple laser burns in the macula, one of which crossed the fovea. The patient underwent follow-up examinations. Two weeks later, the fundus examination showed bilateral multiple peripheral laser scars, as well as a laser burn just across the left foveal region and a few parafoveal laser burns [Figure 2]. The OCT image demonstrated an inadvertent burn at the foveal region and multiple parafoveal laser spots, with the disrupted corresponding external limiting membrane (ELM), ellipsoid (EZ), and interdigitation zones [Figure 3].

During the next 3 months, the vision and fundus examinations stabilized. In the OCT imaging, EZ and ELM defects were detected with retinal pigmented epithelium (RPE) hyperplasia and hyperreflective foci (compatible with hard exudates) [Figure 4]. According to the OCT angiography, multiple flow void areas were involved at the choriocapillaris level [Figure 5]. In comparison, on the third follow-up visit, 6 months after the laser therapy, the BCVA reached 20/20 in the affected eye, and the Amsler Grid examination was unremarkable. In fundus examinations, PRP laser scars were found in both eyes, while foveal and parafoveal burns were still visible. However, OCT imaging showed that the ELM defect had fully recovered and, compared to previous images, the EZ defect had become smaller in size [Figure 6].

DISCUSSION

In ophthalmology, retinal laser modalities play a significant role in therapeutic procedures, especially in patients with diabetic retinopathy. In these patients, PDR and severe non-PDR indicate laser therapy through PRP to decrease the risk of fibroproliferative changes and consequent visual impairment.[3] One of the most important complications of retinal laser therapy including PRP is accidental macular burn with permanent visual impairments. It has been demonstrated that the majority of these complications are secondary to high laser beam duration and power.[1,4,5] One of the PRP modalities

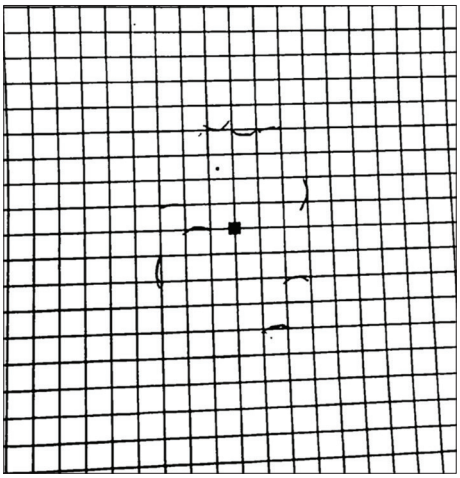

Figure 1: Amsler grid of the left eye, a scotoma was found.

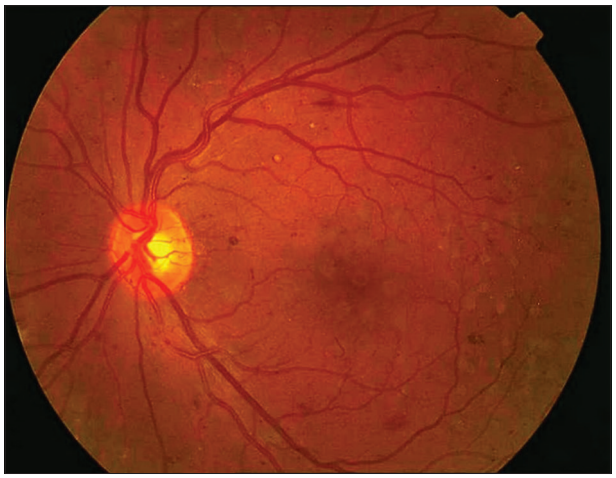

Figure 2: Fundus photograph, 14 days after panretinal laser photocoagulation and inadvertent macular burn, multiple laser spots were detected and one of them involved the fovea.

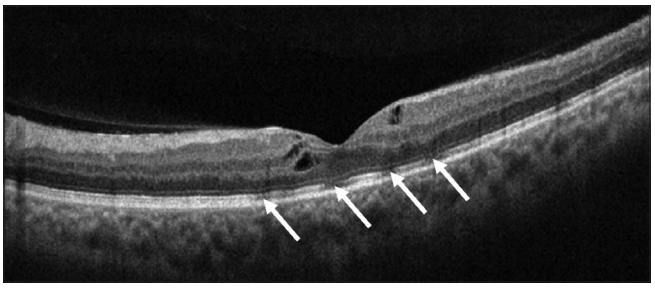

Figure 3: Macular optical coherence tomography, 14 days after panretinal laser photocoagulation, multiple defects in ellipsoid zone (white arrows) with spongy macular edema were detected.

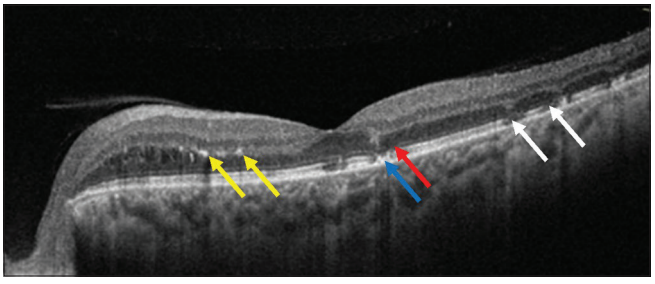

Figure 4: Macular optical coherence tomography, 3 months after panretinal laser photocoagulation, defects in external limiting membrane (red arrow) and ellipsoid zone (white arrows) with retinal pigment epithelium hyperplasia (blue arrow), and some intraretinal hyper-reflective foci (hard exudates, yellow arrows) were found.

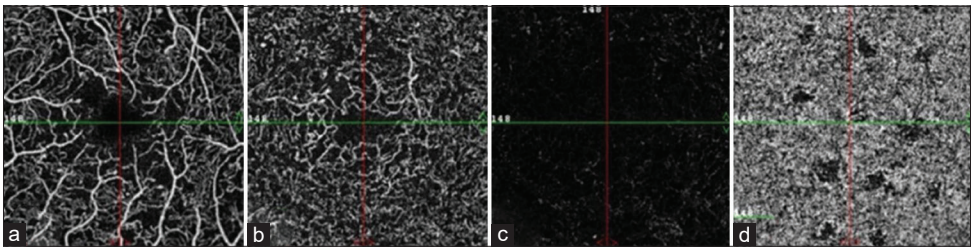

Figure 5: Macular optical coherence tomography angiography, 3 months after panretinal laser photocoagulation, superficial retinal capillary plexus (a), deep retinal capillary plexus (b), and vasculature of outer retina (c) seems to be normal. But multiple flow void areas in the choriocapillaris layer were detected (d).

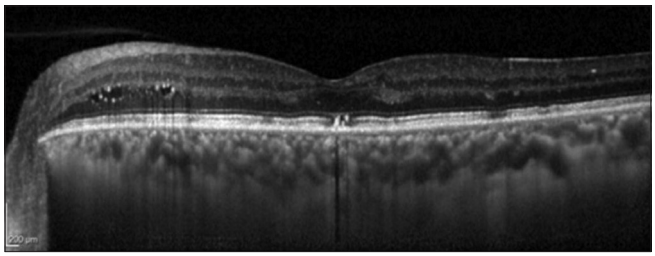

Figure 6: Macular optical coherence tomography, 6 months after panretinal laser photocoagulation, near normal integrity of external limiting membrane and ellipsoid zone was detected.

is Pascal® laser, which applies a rapid sequence of multi-spot burns.[1] Many experts are vigilant about the possibility of inadvertent foveal burns with this modality when using array patterns.[6,7] Macular laser burns cause loss of photoreceptors and can expand beyond the boundaries of the initial burning spot during the time. The degree of this expansion mostly depends on the duration of each laser pulse.[6,7] The previous studies showed Pascal® burns with 10 ms duration have a 50% reduction of outer retinal disruption lesion size during a 1-year follow-up. Histologic studies have revealed that in a barely visible burn, the RPE and photoreceptor cells can migrate toward the center of the lesion, resulting in a decrease in the burn size over time.[1] A reduction in the size of the outer retinal disruption zone and migration of RPE and photoreceptors to this affected zone of the fovea may be the cause of visual recovery, as presented in follow-up evaluations of our patient.

It is noteworthy that our patient had an inadvertent foveal burn after PRP with complete visual recovery during a short time. This presentation is completely rare and we found only a limited number of similar cases in the literature. Perwez *et al*.[8] reported a diabetic patient who had accidental foveal burn during PRP. We treated the patient with oral corticosteroid and topical non-steroidal anti-inflammatory (NSAID) drops for a short period and then underwent follow-up examinations. The patient showed improvement in visual acuity (the BCVA was improved from 20/200 to 20/60) for 5 years. Nevertheless, in most reported cases with visual recovery after macular laser burn, the site of burning was outside the fovea.[9]

We preferred to follow our patients after the complication by multimodal imaging without any treatment. According to few reported cases in the literature, this condition may be a response to anti-inflammatory topical medications including corticosteroids and NSAIDs.[8]

We showed that despite foveal burn during PRP, visual acuity might improve during the time. However, to avoid this complication, it is necessary to find the fixation point and use akinesia in poor cooperative patients.[8]

CONCLUSION

As a rare condition, laser burns around the foveal region seem to have the chance of RPE and outer retinal recovery over time. Although the final visual outcome is determined by the severity and location of the injury, in most of the similar conditions, these accidental foveal laser burns lead to permanent severe visual impairment. The need to educate on and emphasize foveal safety for those using retinal lasers is necessary, and well-trained physicians must do these procedures.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Reddy SV, Husain D. Panretinal photocoagulation: A review of complications. Semin Ophthalmol 2018;33:83-8.

2. Stanga PE, Muqit MM, Marcellino GR. Microstructural changes following inadvertent multi-spot laser photocoagulation of the fovea. Graefes Arch Clin Exp Ophthalmol 2012;250:945-7.
3. The diabetic retinopathy study research group. Photocoagulation treatment of proliferative diabetic retinopathy. Clinical application of diabetic retinopathy study (DRS) findings, DRS report number 8. The Diabetic Retinopathy Study Research Group. Ophthalmology 1981;88:583-600.
4. Bressler NM, Beck RW, Ferris FL. Panretinal photocoagulation for proliferative diabetic retinopathy. N Engl J Med 2011;365:1520-6.
5. Tatham AJ. Clinical advantages of swept-source OCT and new non-damaging laser treatments. Rev Ophthalmol 2014;2014:1-8.
6. Ishiko S, Ogasawara H, Yoshida A, Hanada K. The use of scanning laser ophthalmoscope microperimetry to detect visual impairment caused by macular photocoagulation. Ophthalmic Surg Lasers 1998;29:95-8.
7. Schatz H, Madeira D, McDonald HR, Johnson RN. Progressive enlargement of laser scars following grid laser photocoagulation for diffuse diabetic macular edema. Arch Ophthalmol 1991;109:1549-51.
8. Perwez K, Kankambari P, Lubna K, Nutan S. Accidental foveal burn following pan retinal photocoagulation and its long-term outcome. Int J Case Rep Images 2017;8:609-12.
9. Asano T. Accidental YAG laser burn. Am J Ophthalmol 1984;98:116-7.

How to cite this article: Abdi F, Daneshtalab A, Gordiz A, Zand A. Complete visual recovery after an inadvertent foveal burn. Lat Am J Ophthalmol 2023:6:8.