



Subthreshold Laser Therapy for the Treatment of Refractory Diabetic Macular Edema: A Case Report

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Abstract

Diabetic macular edema is a common complication of diabetic retinopathy that causes loss of visual acuity. It becomes more challenging to treat when it involves the center of the macula. Monthly intravitreal injections are a burden for patients and focal photocoagulation laser has limitations that inhibit its use over the macula. Subthreshold laser therapy has been shown effective in treating mild diabetic macular edema. This case reports the successful treatment of moderate center involved diabetic macular edema with subthreshold laser therapy.

Keywords: Diabetic Macular Edema; Subthreshold Laser Therapy

Introduction

Diabetic retinopathy is one of the leading causes of visual acuity loss worldwide [1]. The main cause of visual impairment in these patients is diabetic macular edema (DME), which can occur at any stage of the disease [2]. The role of inflammation has been suggested to be a key factor in the development of DME [3]. For many years, focal laser photocoagulation had been the gold standard for management of DME to reduce the risk of vision loss [4,5]. However, anti-vascular endothelial growth factors (VEGF) agents have been established to result in better visual acuity in patients with DME than those treated exclusively with laser photocoagulation [6-8].

In recent studies, subthreshold laser therapy (SL) has been shown to be effective in the treatment of mild DME [9]. It is a safer alternative to laser photocoagulation since it does not cause structural damage to the underlying photoreceptor layer and prevents

retinal scars, allowing both anatomical and functional preservation of the retina [10,11].

Herein, we report a case of DME refractory to intravitreal bevacizumab and focal laser photocoagulation (FOCAL).

Case Report

A 63-year-old Hispanic female with a history of diabetes mellitus (DM) presented with blurred vision, more significant in the left eye (OS) than the right eye (OD). The vision had been worsening progressively for several months until she decided to seek treatment.

On examination, best-corrected visual acuity (BCVA) was 20/100 in both eyes (OU) and intraocular pressure was 25 mm Hg OU. Slit lamp examination showed no abnormal findings OU. Dilated fundus examination was remarkable for background diabetic retinopathy and center involved macular edema (CI-DME) OU

(Figure 1A and 1B). Macular optical coherence tomography (OCT) showed moderate CI-DME with a central macular thickness (CMT) of 598 μm at presentation (Figure 2A).

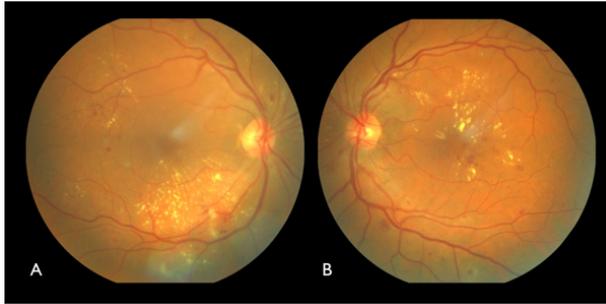


Figure 1: 63-year-old Hispanic female with a history of diabetes mellitus (DM) presented with blurred vision OU. (A) Fundus photo OD and OS (B) showed background diabetic retinopathy and center involved diabetic macular edema (CI-DME).

The patient was treated with an intravitreal bevacizumab injection and a session of FOCAL to the peripheral retina OU at initial presentation, followed by another session of FOCAL 2 months later. This resulted in the improvement of the CI-DME and an increase in the BCVA to 20/50 OD. However, the left eye failed to show a significant response to treatment at 2-month follow-up (Figure 2B). Combinations of intravitreal bevacizumab and FOCAL were used to treat the patient for the following 2 years, but persistent CI-DME was observed with CMT of 406 μm (Figure 2C). Subthreshold laser therapy was then added to the treatment regimen OS. This was done with the Easy Ret[®] 577nm Laser by Quantel Medical in the subliminal laser pattern mode. This treatment resulted in dramatic improvement of the CI-DME with CMT of 237 μm on OCT 3 months after SL therapy (Figure 2D). BCVA also improved to 20/30 OS.

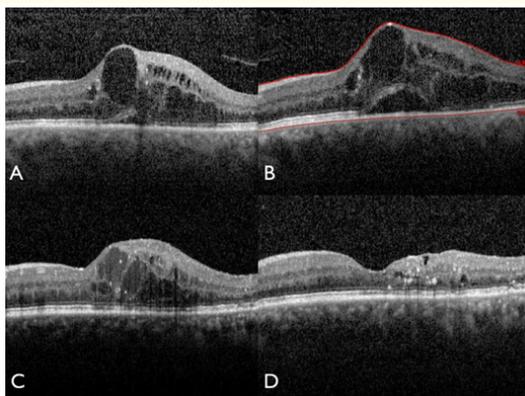


Figure 2: (A) Optical coherence tomography (OCT) of the left eye revealed CI-DME. (B) Treatment with monthly intravitreal injections for 2 months and 2 sessions of FOCAL failed to resolve the CI-DME. (C) Despite continuation of the monthly intravitreal injections and FOCAL sessions for 2 years, the CI-DME did not resolve. (D) Application of subthreshold laser therapy resulted in dramatic resolution of CI-DME.

Discussion

In recent years, new management options to treat DME emerged. This is due to the fact that, even though intravitreal anti-VEGF is an effective treatment that results in improvement of vision, the possible lifetime duration of the therapy is incompatible with most of the patient's lifestyle as monthly injections can become a heavy burden for patients on the long term [12].

In addition, the use of conventional FOCAL treatment is usually avoided over the macula to prevent visual loss as it can result in damage of the outer retina and subsequent scar formation. Although the mechanism is unknown, it has been proposed that the laser scars result in apoptosis of the photoreceptors, retinal pigment epithelium, and choriocapillaris [13]. However, the inner retina is relieved of hypoxia due to the fact that the scar allows oxygen to diffuse through it [13].

A study by Chhablani, *et al.* in 2018 showed SL to be safe and effective in achieving better anatomical, visual, and functional outcomes in the treatment of DME [14]. This and other studies have encouraged retina specialists to incorporate SL as a monotherapy or as an adjuvant to anti-VEGF in the treatment of DME.

This patient showed significant improvement in BCVA when SL was incorporated in the management for her moderate CI-DME. SL was applied to the macular region without fear of complications since it does not cause structural damage to the underlying photoreceptor layer and prevents retinal scars, allowing both anatomical and functional preservation of the retina [10,11]. SL demonstrated significant improvement of moderate CI-DME and vision in this patient that was maintained 8 months after treatment.

Conclusion

Frequent anti-VEGF injections for the treatment of CI-DME can be a burden for patients. Newer management options, such as SL, may decrease this burden in refractory cases. This case demonstrated SL therapy to be successful in managing moderate CI-DME, resulting in a significant increase in BCVA as well.

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