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Diabetic Macular Edema: The Role of MicroPulse Laser Therapy in the Anti-VEGF Era

An excellent first-line treatment for patients who do not want injections, or those with limited disease.

BY ELIAS REICHEL, MD, AND ADAM H. ROGERS, MD

This article highlights key topics addressed during an educational webinar on MicroPulse Laser Therapy presented by Drs. Elias Reichel and Adam Rogers, and can be viewed in its entirety at eyetube.net/series/iridex-2015/AKOKI.

What clinical work has been done in evaluating MicroPulse for the treatment of DME?

Elias Reichel, MD: There have been a number of studies evaluating MicroPulse technology (IRIDEX). Vujosevic[1] looked at diabetic macular edema (DME) patients treated with MicroPulse and evaluated these patients with microperimetry and fundus autofluorescence. They found that these patients did not lose any sensitivity in the macula after MicroPulse treatment. In fact, they gained sensitivity to the retina. Lavinsky[2] also looked at a series of patients comparing modified ETDRS laser photocoagulation treatment protocol versus a high-density MicroPulse protocol versus a low-density MicroPulse protocol. What was really interesting is the high-density MicroPulse protocol showed the greatest visual acuity (VA) gains of about 2 lines or 12 letters of vision. The take-home point here is that it is very important to treat large areas of the retina. Using a modified grid or a higher density grid that is not at the highest level of density, meaning confluent, achieves less desirable results.

Luttrull[3] also looked extensively at the use of MicroPulse for treating DME, and the important message here is that with a 5% duty cycle, meaning the percentage of time the laser is activated and delivering energy to the retinal pigment epithelium (RPE), you virtually see no retinal damage. If you switch to a higher duty cycle, you see more damage—and that intuitively makes sense. In another study, Luttrull[4] delivered high-density subthreshold MicroPulse laser — including over the fovea—in nearly 40 eyes in more than 25 patients with DME. What was interesting about this study is that the pretreatment VA was 20/40 or better, which was maintained at nearly a year posttreatment. There were no reported adverse events, vision improved in all patients, and reduction in macular edema was seen on OCT following treatment.

Does wavelength matter?

Dr. Reichel: Vujosevic[5] conducted a prospective, randomized study to compare 810 nm versus 577 nm MicroPulse on patients with DME. With comparable parameters—noting that infrared wavelengths require more power relative to using visible wavelengths—results were equivalent when looking at decrease of central retinal thickness and improvement in retinal sensitivity at 6 months follow-up.

> "I use [MicroPulse] for almost all my patients who have very limited DME because there is no damage, and it is fabulous for those patients."
>
> —*Adam H. Rogers, MD*

How do you incorporate MicroPulse laser therapy in your treatment regimen of DME?

Adam H. Rogers, MD: MicroPulse definitely has a role for treatment of macular edema. It is an excellent alternative for patients who are showing either limited response to conventional treatment (such as anti-VEGF or steroid) for diabetes or vein occlusion. It is also an excellent first-line treatment for patients who do not want injections, or for patients who have very limited disease. It is a very convenient treatment.

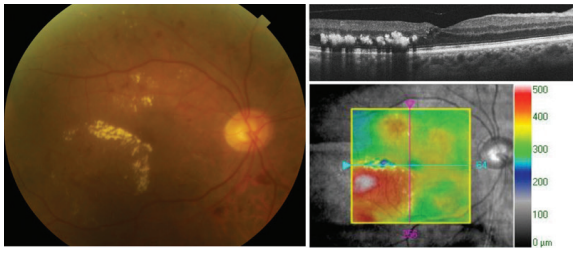
Dr. Reichel: In treating macular edema, I think the ideal retinal thickness for using MicroPulse is between 300 µm to 450 µm. It does not mean you cannot use it for greater amounts of macular edema, but this is the "sweet spot" where MicroPulse, I think, really works very well.

In addition to DME, what other indications can I treat with MicroPulse?

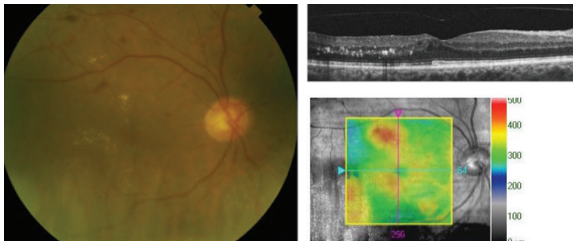
Dr. Rogers: MicroPulse can be used as first-line treatment, adjunct to current therapy, or an option to pharmacotherapy for other retinal applications, such as macular

Case Example

Male patient with excessive exudation and clinically significant DME in both eyes, but especially in the right eye.



Pre MicroPulse: Patient received a few anti-VEGF and Kenalog treatments, but repeated or recurrent macular edema occurred within a few months, and within 6 weeks of any anti-VEGF. TxCell-Guided MicroPulse was delivered with 200 µm spot, 200 ms duration, 400 mW, 5% duty cycle, 7x7 grid with confluent, zero spacing.



At 7 months post 2 MicroPulse treatments: Vision improved 1 line, and reduction in fluid was visible on OCT.

edema due to branch retinal vein occlusion, central serous retinopathy, radiation retinopathy, and macular telangiectasia. In addition, it can be used for the anterior segment for the glaucoma physicians in your group. It is ideal for the multispecialty practice.

What are your MicroPulse treatment parameters and technique?

Dr. Rogers: I treat over the fovea using the standard power settings: 200 µm spot size, 200-ms duration, 400 mW power, a 5% duty cycle, and a 7 x 7 confluent grid, meaning that there is no spacing.

Dr. Reichel: I think that pigmentation plays a role in the power setting. If you have a lightly pigmented patient, you may want to increase the power, for example, 450 mW to 500 mW. If you have a darkly pigmented individual, you may want to lower the power to somewhere between 250 mW to 350 mW. Assess the fundus for pigmentation and adjust powers accordingly.

As a first-time MicroPulse user, what should I expect?

Dr. Rogers: With MicroPulse, there is no obvious "wow" effect within 2 or 3 weeks in terms of dramatic fluid reduction. It takes slightly longer than with pharmacotherapy to see the effects of treatment; however, the results are much more durable. I would not recommend retreatment at 4 or 6 weeks. Retreating patients with MicroPulse can be considered 4, 5, or 6 months later, if needed. Patients have no discomfort compared with intraocular injections.

Dr. Reichel: MicroPulse takes time to work. It somewhat mirrors what we saw in the Protocol I[6] data for laser photocoagulation. It took 1 to 2 years to see final VA improvement with laser alone, and this has been repeated in many clinical trials. It is important to remember to be patient.

What are the benefits of MicroPulse laser therapy?

Dr. Rogers: I use MicroPulse for my patients who are either tired of injections and want to try another treatment, or simply do not want injections. I would say, for non-center involving DME, it is the go-to treatment. I use it for almost all my patients who have very limited DME because there is no damage, and it is fabulous for those patients. When you use MicroPulse in conjunction with either anti-VEGFs or intravitreal Kenalog, it is very effective and you can enhance your VA results. It is an excellent adjunct to intravitreal pharmacotherapy.

In addition to MicroPulse, the IQ 577 laser and TxCell Scanning Laser Delivery System (IRIDEX) can also be used for continuous-wave single-spot delivery and pattern panretinal photocoagulation. In general, MicroPulse and the TxCell-Guided laser system, has been an excellent addition to our practice at Tufts University. ■

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