

Improving results with greater precision

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In short...

DME is a common diabetic eye disease and one of the leading causes of blindness. Standard therapy for this disease has been focal laser treatment for some time and with advances in laser technology, improvements in results and precision have been enabled. In this article, Dr Gupta discusses the Endpoint Management software for the PASCAL photocoagulator as a treatment option for his DME patients.

Diabetic macular oedema is a common diabetic eye disease and leading cause of blindness in American adults.¹ In the UK alone, DME was expected to be present in 187842 diabetic patients in 2010, increasing to 235602 by the year 2020.² Treating diabetic macular oedema (DME) with focal laser treatment has been a standard of care therapy for some time now.

Fortunately, advances in laser therapy have yielded refinements in pulse duration, lesion intensity and several other parameters, improving overall quality of treatment. A recent application furthering physician control over these

factors is the Endpoint Management software available for the PASCAL Photocoagulator (Topcon Medical Laser Systems, Santa Clara, California, USA).

Development of treatment protocols

Traditionally, focal or grid photocoagulation involved applying high-energy laser burns to the macula, resulting in visible macular scars across the treatment area. To limit ischaemia and decrease the production of angiogenic factors, this intense photocoagulation was considered necessary. Over time, these lesions would expand and potentially 'creep' towards the fovea. These traditional treatments have been associated with severe complications, including decreased visual acuity (VA), visual field deficits and choroidal neovascularization (CNV).

The goal of focal laser treatment for DME should be to combine safety with efficacy. In this case, that means a resolution of — or, at least, a significant reduction of — macular oedema. Hopefully, this will facilitate improved or preserved vision. The idea that visible lesions are not necessary for effective treatment has been reinforced by the recent success of micropulse lasers.³ However, one distinct disadvantage of micropulse is its difficulty and complexity in setting laser dosimetry. A key advantage of Endpoint Management is its Landmark feature, which delivers laser application at the visible, titrated dose.

The goal of sub-threshold laser treatment is to achieve the best results with reduced energy, thereby reducing unintended effects from thermal reaction. Endpoint Management first titrates to a comfortable visible endpoint and then uses algorithms to modulate power and duration, enabling control over treatment endpoints.

New options

Over the last several months, I have been using Endpoint Management to treat DME. I begin my treatments in 'titrate mode', on a very low power setting: just enough to see blanching. Once I obtain that baseline mark, I switch the laser off to titrate. The software automatically sets energy output at just lower than the level used to create the baseline whitening.

I then apply my laser treatment pattern, typically using 2x2 and arc grid patterns. I can add a grid with uniform intensity or vary the grid so that landmarks use a higher amount of energy than central points. In this instance, endpoints would deliver a reduced amount of energy as set by the endpoint percentage. These points would use just enough energy to stimulate the retina into pumping out accumulated fluid, but not enough to cause visible whitening of the RPE and actual thermal burn. Here, greater physician control yields a more precise — and potentially efficacious — treatment.

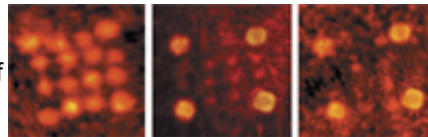


Figure 1: Left: EM turned off (all burn spots set at light burn). Centre: EM at a high endpoint percentage (Landmarks set at light burn and middle spots at barely visible). Right: EM at a low endpoint percentage (Landmarks set at light burn and middle spots set at sub-visible).



My power settings are approximately 50% greater than before, but my exposure times have been reduced dramatically. Burns are effectively being applied simultaneously, so the interval is not calculated. Exposure, however, is manipulated. A typical setting for a grid laser would be 150 mw of power for 10 ms exposure. Previously, my settings with other lasers were 100 mw of power for 100 ms duration. With PASCAL, power is increased to compensate for this significant decrease in duration and exposure. And by using Endpoint Management, this 150 mw of power can be applied to some, rather than all, of the burns, while others are made at lower, customizable power settings, thereby accomplishing subthreshold treatment.

Results

Figure 2: Endpoint Management with Landmark Patterns allows both visible, titrated application (red Landmark) in the periphery along with low dose Endpoint application (yellow, centre of pattern).

I have used this system for only a limited time. Recently, I have been conducting follow-up patient visits sooner than the standard six to eight weeks posttreatment. So far, an increased number of patients are showing excellent results in a shorter time period than I expected. I have noted complete resolution of DME in some patients 3 to 5 weeks out from their treatment.

I attribute these promising results to a precise, uniform treatment that exposes the macula to less heat energy while still remaining therapeutic. Before, it was often very difficult to create an exact, reproducible laser thermal energy delivery for every single burn. And when trying to perform subthreshold laser, there was no real means of control over individual spots in the grid. The combination of a titratable start point, a good, even distance between spots and a uniform burn makes a considerable difference, especially while applying an extensive, arcshaped grid.

Conclusion

The elements of an effective treatment are safety, quality and results. The outcome of a procedure should be considered with respect to what goes into it: efficiency being one such variable. Taking procedure and follow-up care into account, PASCAL with Endpoint Management represents a highly efficient and effective treatment. Most importantly, it is safe and comfortable for the patient. We don't try to improve vision solely for the present; we want our patients to maintain their vision five, ten or fifteen years from now. In my opinion, PASCAL is a promising step in that direction, and Endpoint Management strengthens its versatility and inherent means of control. Together, they provide results while simultaneously improving patient safety and reducing visible scarring.

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. Dr. Gupta states that he has no financial interest in the products discussed in this article.

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