

# THE BENEFIT OF TREATING OCULAR AND FACIAL ROSACEA FOR MGD

The underlying inflammation common to rosacea and MGD may respond to IPL therapy.

BY SHEILA C. BARBARINO, MD



Ophthalmology is facing some difficult challenges in the coming years in the form of a swelling patient population but a declining potential for reimbursement. Fees for commonly performed procedures and diagnostics are being drastically reduced, and at the same time, over-

arching changes in the structure of how Medicare operates are de-emphasizing the role of procedures in managing patients. A greater interest in preventive medicine is not necessarily a bad thing, but it does require an adjustment to the kinds of services ophthalmologists offer in order to maintain economic viability.

One strategy that has been advanced is to increase efficiency to increase patient volume, with the notion that higher throughput will make up for any shortcomings in revenue. Another strategy, and one that is not mutually exclusive, would be to attract new types of patients to the practice through novel offerings, particularly if the offerings are elective, fee-based services. This has been one of the motivating factors in incorporating aesthetic procedures into ophthalmology, a field that already deals with a number of individuals interested in quality-of-life upgrades in the form of LASIK, cataract surgery, blepharoplasty, and reconstructive surgery.

Although aesthetics are important service offerings in their own right, some of these complementary services can serve the interest of ocular health. The interplay between cutaneous rosacea, ocular manifestations, and dry eye disease (DED) offers one example where treatment for the skin condition may be medically prudent for reducing the impact of the ocular consequences.

## A NATURAL CROSSOVER

Ophthalmologists are trained experts in treating problems pertaining to the skin surrounding the eyes, as there are several dermatologic conditions that either

have ocular symptoms or the potential to invade the eye, including eczema, atopic dermatitis, and lid lesions. Being able to differentiate potentially devastating skin diseases around the eye (including basal and squamous carcinoma, melanoma, and sebaceous carcinoma) from noncancerous lesions (squamous papilloma, seborrheic keratosis, epidermal inclusion cysts, or chalazia) is a necessary part of performing a comprehensive eye examination. Thus, it is not too much of a stretch to imagine making a leap from dealing with ophthalmic patients to aesthetic and cosmetic procedures. After all, Botox (onabotulinumtoxinA; Allergan) and Latisse (bimatoprost ophthalmic solution; Allergan) were pioneered by ophthalmologists before moving to the aesthetics dermatology market.

The overlap of treatment modalities goes in the other direction as well. In my practice, I use several laser platforms for the treatment of ocular skin conditions that are also widely used by dermatologists. One such device, the Lumenis M22 intense pulsed light (IPL) multimodal platform, is a versatile treatment modality that is applicable to many dermatologic and ophthalmic conditions. The FDA has approved the treatment of more than 30 skin indications using the Lumenis M22 IPL with Optimal Pulse Technology (OPT). The M22 platform is equipped with a variety of predefined presets (fluence, pulse duration, and other parameters) designed for optimal treatment of different skin conditions; however, the settings are also customizable, serving to broaden the applicability of this device. The user can adjust these settings and use various wavelength filters to target different chromophores, depths, and skin types.

## IPL FOR ROSACEA

One of the applications for IPL therapy is facial rosacea, which is an entity that ophthalmologists should be aware of for its potential to have an impact on the skin around the eyes. Rosacea's presentation on the skin often precedes or is

# INTENSE PULSED LIGHT THERAPY FOR MGD-RELATED DRY EYE DISEASE

Interim results of an ongoing study.

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We recently reported the interim results of a prospective, single-armed, multicenter case series that examined the efficacy of intense pulsed light (IPL) for treatment of dry eye caused by meibomian gland dysfunction (MGD).<sup>1</sup> Our initial experience suggests that IPL is an extremely promising

intervention. Our findings are in agreement with the work of Rolando Toyos, MD, who observed that patients who were treated with IPL for various skin conditions reported significant improvement in their ocular symptoms and signs, in some cases including resolution of concomitant MGD.<sup>2</sup>

## BACKGROUND

For the study, 40 patients with moderate to severe MGD were enrolled from two centers in the United States. Patients were treated using IPL with Optimal Pulse Technology (OPT) on the Lumenis M22 platform. Each patient was treated in four sessions at 3-week intervals, and followed-up at 9, 12, and 15 weeks after the initiation of treatment.

The primary outcome was the change in tear breakup time (TBUT) from baseline to the final follow-up. Secondary endpoints included change from baseline in standard patient evaluation of eye dryness or SPEED score (subjective symptoms), meibomian gland score, tear osmolarity, corneal fluorescein staining, and lipid layer thickness measured at each of the three follow-up visits.

IPL with OPT offers several theoretical safety advantages compared with other IPL delivery systems. In OPT, the IPL energy is evenly distributed during the pulse. This enhances safety and lessens the likelihood of delivering a suboptimal treatment. On the M22 platform, the treatment may be performed using one of the predefined settings (for example, the “rosacea/telangiectasia” setting); however, the operator has the ability to titrate and adjust the IPL parameters so as to take account of immediate skin responses.

Treatment was applied from ear to ear over the malar area. Skin types 1 through 3 were treated with a double-pass technique using the rosacea/telangiectasia preset and a high-pass filter of 560 nm; skin types 4 and 5 were treated with the same preset but with a 590-nm high-pass filter using a single-pass technique. Presence of skin rosacea was not required as an inclusion criterion, neither was it necessary for patients to have concomitant ocular rosacea.

## STUDY RESULTS

So far, we have collected and analyzed data from 18 eyes that completed the schedule of treatments and follow-ups: by the end of the study, the mean TBUT improved by 164% ( $P < .0001$ ). Significant improvements were also recorded at all three follow-ups in SPEED scores, corneal fluorescein staining, meibomian gland scores, and tear osmolarity.

Lipid layer thickness measurements did not change much by the end of the study; however, upon subjective evaluation, the integrity of the lipid layer appeared to improve significantly.

Additionally, more than 85% of patients reported improvement of their dry eye symptoms; 100% of patients had a reduction in the number of signs associated with DED. Patients reported a decrease in eye drop use.

## DISCUSSION

We believe that IPL directs intense energy that is preferably absorbed in the hemoglobin of abnormal blood vessels, initiating a process that destroys the abnormal blood vessels and decreases the release of proinflammatory substances. In addition, the heat produced by absorption of IPL energy may have an additional two-fold effect: reducing the bacterial load on the eyelids by heating up and thus eliminating *Demodex* mites and liquefying viscous meibum by warming the meibomian glands.

The initial results of this study are notable for the high degree of success in treating an insidious disease entity that

is difficult to treat. Completion of the study, and longer-term follow-up, will provide additional information about the viability of IPL with OPT for treatment of MGD-related dry eye.

The improvement in osmolarity scores in this study is encouraging, as it serves as evidence that IPL treatment may interfere with a persistent, self-perpetuating cycle of inflammation. Hyperosmolarity is a central mechanism of DED and tear film instability, causing damage to the ocular surface and activating a cascade of inflammatory events.<sup>4</sup> Published studies suggest that decreases in tear hyperosmolarity precede improvements in patient-reported symptoms<sup>5</sup>; the implication is that breaking a cycle of inflammation early in the natural history of the disease improves outcomes. In our study, in the majority of patients, IPL effectively lowered osmolarity to normal levels. This result indicates that IPL treatment produces a durable and lasting effect by stopping the chronic inflammation of meibomian glands, thus enabling the restoration of a viable tear film.

It was not unusual for patients in our study to experience a benefit immediately after the first treatment that waned by the first follow-up, but became more pronounced by the second and third follow-up. Of note, TBUT, which is a viable index of functional improvement, continued to improve over time. This waxing and waning effect of IPL in the short-term with modest to profound improvement overall in the intermediate-term is not surprising given the chronic nature of inflammation associated with MGD and dry eye disease. As we study more patients, we will continue to learn about how we can best use IPL to more completely treat the inflammatory component. We believe that the treatment

protocol used in the study was robust and sufficient to abate inflammation, although adjustments of IPL settings may be required.

Although lipid layer thickness did not improve significantly by the end of the study, this may be less significant than improvements observed in the quality of the lipid layer. First, in some cases patients were enrolled with part of their meibomian glands already atrophied. In such cases, improvements in lipid layer quantity is extremely unlikely, if not impossible. Second, one has to remember that in DED, structure and function do not always correlate. Hence, restoration of the lipid layer may not be a necessary condition for patients to exhibit gains in signs and/or symptoms.

We look forward to analyzing the results of additional patients enrolled in our case series. Based on our initial experience, IPL appears to be a viable and potentially advantageous treatment option for MGD-related DED.

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concurrent with ocular manifestations. In 20% of cases, ocular rosacea precedes facial rosacea.<sup>1</sup> Ocular rosacea can be a precursor to or a trigger of meibomian gland dysfunction (MGD) and resultant DED, with the most probable mechanism being the spread of inflammation to the eyelids.

It is well established that IPL has a beneficial mechanism of action with regard to rosacea, suggesting the treatment's utility in other inflammatory conditions. In rosacea, abnormal blood vessels (telangiectasia) release pro-inflammatory agents and matrix metalloproteinases, thus contributing to a chronic state of inflammation that threatens the eyelids and ocular surface. IPL energy is selectively absorbed in the hemoglobin of these abnormal vessels, leading to their destruction and to the reduction of this inflammatory source.

In the absence of treatment, cutaneous rosacea can trigger MGD. As many as 80% of patients with rosacea manifest some degree of MGD.<sup>2</sup> Cutaneous rosacea may also be associated with blepharitis (eyelid inflammation) and rosacea keratitis (corneal involvement), each of which is as an independent risk factor for the onset of MGD and DED. There are several pathways whereby rosacea itself can trigger MGD. For example, as epithelial turnover increases in rosacea,<sup>3</sup> dead epithelial cells form debris that can accumulate near the eyelids and clog the meibomian glands' orifices, thus disrupting the normal flow of meibum. Equally as likely, cytokines and chemokines released by newly formed aberrant blood vessels initiate an inflammatory cascade that invades the meibomian glands via the rich vasculature of the eyelids.<sup>4</sup> Persistent

inflammation of the meibomian glands eventually result in atrophy and drop-out of the glands.

Rosacea may also have indirect pathways to MGD. Skin edema, often accompanying rosacea, boosts the proliferation of *Demodex* mites. *Demodex* skin parasites are infested with *Bacillus olerinus* bacteria. When the bacterial load in and around the eyes rises, expression of Toll-like receptor 2 increases, thus enhancing production of antimicrobial peptides that result in inflammation and additional vascular changes.<sup>5</sup> Additionally, wastes and byproducts of the proliferating bacterial microenvironment may clog the meibomian glands and have a negative impact on the viscosity of meibum.

### MEDICAL BENEFIT FROM AN AESTHETIC TREATMENT

Rosacea presents a fascinating case where treatment of a supposed aesthetic condition can have implications for facilitating better ocular health. Work by Rolando Toyos, MD, showed that patients who have had IPL treatments for various skin conditions, including rosacea, reported significant improvement in their ocular symptoms and signs, in some cases including resolution of concomitant MGD.<sup>6</sup> There is a growing body of literature to suggest that IPL is a potentially effective treatment for MGD.<sup>6-9</sup>

We are conducting an ongoing trial in our clinic looking at the potential for IPL to treat MGD (see *Intense Pulsed Light Therapy for MGD-Related Dry Eye*). So far, we have obtained impressive results, which confirm the versatility of the M22 platform. It should be noted that although IPL is a highly effective treatment for cutaneous and ocular rosacea (Figures 1 and 2), and although patients with ocular rosacea who receive IPL often report improvement of dry eye symptoms, the presence of rosacea was not necessary for enrollment in our study. This is important, because it means that IPL's use is not limited to a subset of patients with both conditions; rather, it appears to be applicable to patients with both or either ocular rosacea and MGD/evaporative DED.

As eye care providers look to an uncertain future with regard to reimbursement, diversifying one's offerings is a strategy worth considering. Ophthalmologists are already familiar with many of the skin conditions that affect the areas around the eye, and they already deal with patients who are accepting of cosmetic procedures. I mentioned earlier that attracting new patients to the practice was one strategy for building more clientele. Many of the patients who would be accepting of aesthetic procedures, however, are already in the average ophthalmic practice seeking refractive surgery and asking about premium IOLs for their cataract surgery. More urgently, DED and MGD are both prominent conditions that are growing in



Figure 1. The Lumenis M22 IPL with OPT system (A) and a patient being treated for rosacea with the system (B).



Figure 2. Before and after photographs of a patient with moderate rosacea who was treated with the Lumenis M22 IPL with OPT system (four sessions, 1 month apart).

relevance to the eye care field. They are important in their own right because of the visual symptoms they can cause, and they are doubly important in the context of surgical patients, as untreated MGD is a risk factor for inaccurate keratometry and biometry, and, therefore, for incorrect IOL power selection. ■

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