Intense Pulsed Light as a Treatment for Dry-eye Disease

A Retrospective Study of Effectiveness, Satisfaction and Adverse Effects

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MGD is the leading cause of evaporative DED. Patients who suffer from this disease produce an abnormal meibum that is more viscous than the usual olive oil like secretion. These patients can have severe inflammation and bacterial overgrowth that exacerbates the problem. Most standard treatments such as anti-inflammatory drops or oral antibiotics aim at decreasing the inflammation associated with this disease. Others have used warm compresses in effort to melt the thick meibum produced by these patients. Finally, doctors have recommended lid scrubs to lower the bacterial load and cleanse the lid margin. Such treatments have been only somewhat effective for patients with MGD leading some to suggest a multi-faceted treatment approach.

IPL has been used in Dermatology practices for several years as a treatment for Rosacea and acne. IPL uses a Xenon flashlamp to emit wavelengths of light from 400 to 1200 nanometers (nm). When placed on the light, a filter restricts the wavelength to the visible light range of around 500nm. When applied to the skin, this 500nm light causes the blood cells in the abnormal tangleactiasis to absorb the light, coagulate and finally to close the blood vessels.

Objective
To describe clinical data concerning the effectiveness and safety of IPL skin treatment using the Toyos Technique as developed and refined over 8 years for eyes with evaporative dry eye due to meibomian gland dysfunction.

Methods
A chart review was conducted for 125 patients with these targeted who presented with signs of severe dry eye as determined by TRUT of <5 seconds and who also had abnormal meibum and abnormal lid margin.

In all cases, study patients were patients who had reportedly tried or abandoned conventional DED treatments and actively sought out the Toyos Clinic. These patients were driven to seek alternatives based on their subjective feelings of discomfort. These patients can have severe inflammation and bacterial overgrowth that exacerbates the abnormal meibum produced by these patients. Finally, doctors have recommended lid scrubs to lower the bacterial load and cleanse the lid margin. Such treatments have been only somewhat effective for patients with MGD leading some to suggest a multi-faceted treatment approach.

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Results
91 patients with 182 eyes presented with severe DED based, in most cases, on a combination of TRUT, abnormal meibum and patient discomfort.

Overall, a statistically significant mean improvement was found (paired T-test p<0.005) in TRUT from initial to end-of-treatment (mean TRUT: 2.8 OD, 2.0 OS) improving to ‘insensitive’ (>5.0 seconds) by 4.0 OS) improving to ‘insensitive’ (>5.0 seconds) by 0.8 OD (p<0.005).

Mean differences in post-TREAT by paired T-test were evaluated further for gender and age quartiles. Statistically significant differences overall in DED were found for both gender and across age quartiles.

The average number of total treatments was 7 (median). The average number of maintenance treatments was 4 (median).

Considering individual differences from start to end-of-treatment, 80% of the 78 patients with post-TREAT TRUT times improved in both eyes, 9% remained the same in one or both eyes, and 5% worsened in one. No patient worsened in both eyes.

Other Metrics
Over 60% of all respondents reported to improve across three metrics (higher medium, 98% lid margin, 95% satisfaction). No patient failed to improve on at least one of the metrics/93% of patients reported satisfaction with the improvement in their DED symptoms (N=68).

Adverse effects
Of the 91 patients, 13 (14%) experienced any adverse events:

- Redness
- Broken blood vessels
- Cheek swelling
- Conjunctival pain
- Hair loss
- Light sensitivity
- Redness of face
- None.

Of the 13, 2 (15%) terminated their treatment.

Discussion
The leading cause of MGD is evaporative DED—a disease in which meibum production is more viscous than usual and from which patients can experience chronic inflammation and bacterial overgrowth that exacerbates abnormal meibum production. Usual treatments have ranged from warm compresses to lid scrubs with usual cases proving easier to treat than moderate and especially severe cases.

Partly understood, the value of IPL for treatment of DED was first identified by Dr. Toyos in 2002 when patients with DED—being treated for Rosacea, acne or other skin problems reported improvements in their dry eye symptoms. Following these and other early observations, modifications to the study treatment technique were made to achieve the current treatment development. IPL devices (DermaMed Solutions Diamond Series Q4) specifically aimed at the treatment of MGD and evaporative DED are used.

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diamond_series_q4.png


Demographics
Demographic differences in responsiveness to treatment were small. While differences in the range of demographic groups should be considered. A larger study population for all demographic groups should be considered.

Limitations
Limitations of the study include the following:

- No comparison group exists in which DED patients were directly evaluated for their responsiveness to alternative treatments.
- Patient satisfaction was measured post-study only and not at pre-treatment.
- The physician who is both the developer of the study treatment technique and the evaluator of its effectiveness. Independent evaluation is warranted.

All told, the results suggest that IPL holds promise as an option for treatment of evaporative DED due to MGD with a limited adverse event profile. A larger sample size with comparison group and random assignment to treatment would be helpful for better assessing both effectiveness of the study treatment technique as well as determining the range and frequency of adverse events. A rigorous multi-site prospective study is currently under development.