

THE EFFICACY OF Q-SWITCHED Nd:YAG LASER WITH Tri-Luma ON DERMAL AND EPIDERMAL MELASMA: A REDUCTION IN MASI SCORE AND IMPROVEMENT IN SKIN TONE AND TEXTURE

Background and Objectives

Melasma continues to be one of the most difficult to treat skin conditions that physicians encounter despite advances in medical and photomedical science. The combined use of a Q-switched Nd:YAG laser (Spectra VRMIII Lutronic, Inc) and Tri-Luma (4% hydroquinone, 0.05% Tretinoin, and 0.01% Fluocinonide, Galderma Laboratories LP, Fort Worth TX, USA) was assessed to determine the efficacy of treating both dermal and epidermal melasma in a variety of skin types in an outpatient laser center.

Study Design and Methods

Thirteen patients underwent pre-treatment assessment to determine suitability as participants in the study. Patients were excluded if they had undergone any treatment for melasma within the previous 3 months or if there were any contraindications to the use of a Q-switched Nd:YAG laser or combination tretinoin, hydroquinone, or flucinolone in a topical preparation. Patients underwent Visia analysis (Canfield Scientific, Fairfield NJ) prior to the initiation of the study and before each subsequent treatment. Assessment parameters included pore size, texture, wrinkle score, and spot count compared to a normalized population (RBX technology). Pre-treatment MASI score was also calculated. Patients were treated with a Q-switched Nd:YAG laser for 8 consecutive weeks. Treatment included a two-step procedure involving the use of a proprietary carbon-based solution (40-micron diameter solution, Lutronic Corporation, Korea) for epidermal melasma and laser toning for dermal melasma. Additionally, the use of Tri-Luma was prescribed during the 8-week course as a once-daily regimen. Success in treatment was based on the reduction in the MASI score as well as improvement in texture, wrinkle score, improvement in the appearance of pores, and reduction in spot score as determined by Visia analysis. Finally, a patient satisfaction survey was completed utilizing a quartile scale. Patient response was scored as positive if a response of very satisfied or satisfied was rendered.

Results and Conclusions

Thirteen patients completed the 8-week study. An overall reduction in the MASI score of 59.5 percent was achieved ($p < 0.005$). Patient satisfaction at the completion of treatment for pore size reduction, improvement in texture, wrinkle reduction, and improvement in pigmentation was 86.6 percent.

The combination of Q-switched Nd:YAG treatment with a unique carbon-based solution indicated for the treatment of epidermal and dermal melasma along with the use of a hydroquinone, tretinoin, and flucinolone topical cream significantly improved dermal and epidermal melasma both objectively through Visia analysis as well as from two subjective treatment assessments including the MASI score and overall patient satisfaction ratings. Additional benefits to skin texture, pore size, wrinkle reduction, and spot count were also realized as a secondary benefit.

Background and Objectives

Melasma is a clinical syndrome characterized by accumulation of melanin within areas of the face which are exposed to the sun. This condition occurs approximately 90 percent in women and can be categorized as centrofacial, malar, and mandibular. It can also be classified histologically as dermal, epidermal, or mixed pattern. Certain conditions and ethnicities are predisposing factors to the development of melasma. Asian and patients of color are most often affected.

The most common causes are likely genetic and then sun exposure according to Pathak¹, but many causative factors of the disease are not clearly understood. Hormonal imbalance including high levels of luteinizing hormone and low levels of estradiol have also been implicated². Increased levels of alpha melanocyte-stimulating hormone in the keratinocytes of patients with melasma have also been implicated³. Thyroid immune disorders have been shown to increase the risk for developing melasma.

Treatment for melasma is also very diverse. Reports of successful treatment with various devices including IPL, phenolic and non-phenolic compounds, and a variety of Q-switched lasers have all been described with some varying degrees of success⁴. Glycolic acid peels have been and continue to be used but have failed to demonstrate any additional benefit when compared to 4 % hydroquinone and daily sunscreen⁵.

The purpose of this prospective study was to determine the efficacy of combination therapy including a Q-switched Nd:YAG laser with a 5 nanosecond pulse width and a topical cream containing 4% hydroquinone, 0.05 % tretinoin, and 0.01% flucinolone. A previously reported study comparing the use of Tri-Luma and the Q-switched Nd:YAG laser in a split face trial of 8 weeks duration demonstrated improved efficacy with the Q-switched Nd:YAG when compared with Tri-Luma.⁶ Patients initially experienced some favorable results with both Tri-Luma and the Nd:YAG, but at the completion of an alternate use study with the Nd:YAG and Tri-Luma, the Nd:YAG laser demonstrated significantly better results. The use of the laser and Tri-Luma during an 8 week course of treatment was employed to hopefully develop a more successful treatment protocol than previously reported since the Q-switched Nd:YAG laser, hydroquinone, tretinoin therapy and topical corticosteroid therapy have at least individually had some positive effect on melasma.

Study Design and Methods

Thirteen female patients with skin types Fitzpatrick I-IV volunteered for the 8 week treatment plan. Patients were selected on the basis of no treatment for melasma in the last 3 months. Each patient had to be willing to undergo weekly laser treatments and be able to utilize Tri-Luma on a daily basis during the 8 week trial. Each patient underwent pre-treatment analysis with VISIA (Canfield Scientific) and was evaluated and scored utilizing the Melasma Area and Severity Index Score (MASI Score) developed by Kimbrough*. The MASI score is a rather complicated assessment scale which takes into account the four areas of the face including the forehead (F), chin (C), right malar region (RM), and left malar region (LM). Homogeneity and darkness of the involved areas, as well as percentages of the areas involved are all taken into account, and a complex numerical score is derived. [Sample calculation; $MASI = 0.3A(d+h) \text{ forehead} + 0.3A(d+h) \text{ right cheek} + 0.3A(d+h) \text{ left cheek} + 0.1A(d+h) \text{ chin}$]

VISIA analysis included assessment of pore size, pigmentation, skin texture, and spots. Additionally UV and traditional photographs were taken at the start of the trial and during each week of treatment. As an analysis based on patient satisfaction, a quartile patient satisfaction questionnaire was created following completion of the study to analyze patient satisfaction with the treatment and outcome. The survey was completed four weeks after completion of the study. Each patient rated their satisfaction with the treatment as very satisfied, satisfied, neutral, or dissatisfied with regard to improvement in pigmentation, pore size, texture, and spots. A positive response was recorded if the patient responded as very satisfied or satisfied.

Weekly treatment sessions were performed by two clinical specialists. On week one, a soft peel (Lutronic, Inc.) was performed followed by a low energy Nd:YAG1064 nm laser toning procedure. All treatments were performed utilizing the Spectra VRMIII (Lutronic, Inc.). The first aspect of the treatment (soft peel) involves the use of a graphite based solution that is applied and allowed to absorb into the skin for a period of 20 minutes. The excess carbon solution is removed with alcohol, and then the treatment is performed utilizing a 7 mm diameter collimated beam. An energy level of 1.5 joules/cm² was utilized. This component of the treatment is designed to target epidermal melasma and remove a portion of the epidermis. The second component of the treatment is the laser toning procedure which was performed on areas of dermal melasma. During laser toning, approximately 2-3 passes with the Q-switched Nd:YAG laser are completed at an initial energy level of 1.7 joules. Mild erythema is expected following laser toning. Care must be taken to not overtreat these areas as the potential to increase pigmentation does exist. Week 2 comprised only the laser toning component and the subsequent week 3 treatment resumed the combination soft peel and laser toning. Week 4 then consisted only of laser toning. This protocol was continued until the completion of the 8th week of treatment. During the treatment period, the energy level for laser toning remained constant as long as continued improvement in the condition occurred. If the patient failed to improve during the weekly session, the energy level for the laser toning was increased. All patients demonstrated acceptable improvement during the treatment period. Laser toning was increased to a level of 2.2 joules for patients who demonstrated more refractory cases of melasma. As part of the treatment protocol, patients were provided a daily sunscreen in which the active component was zinc oxide.



Soft peel with solution



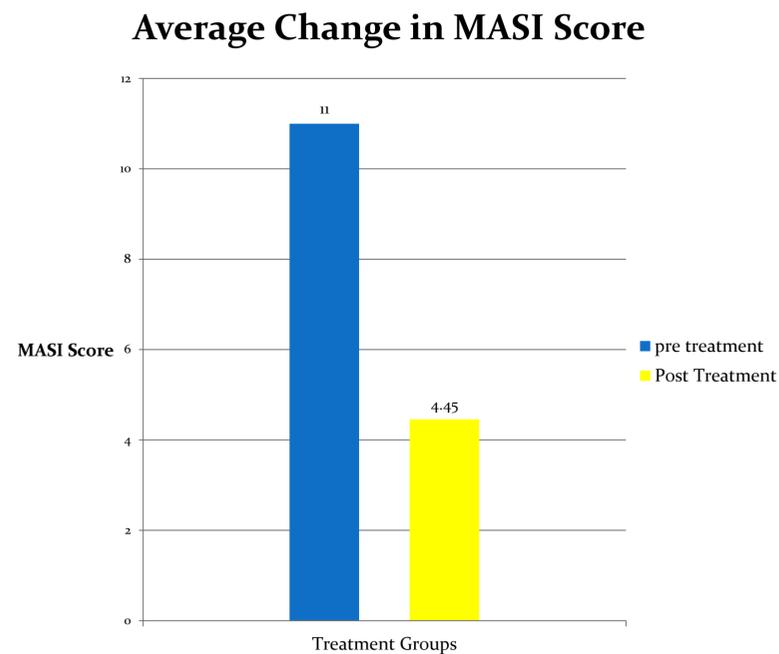
Laser Toning

Results and Conclusions

Thirteen patients completed the 8 week trial. Patients were considered to have successfully completed the trial if they were able to undergo all 8 treatment sessions and utilize both the combination topical cream and sunscreen without significant interruption of therapy. Interruption of therapy was defined as not more than a 2 day lapse in the use of the combination topical cream during any week.

Melasma Area and Severity Index

The MASI score was determined by the example set forth by Kimbrough-Green. The pre-treatment average score was calculated to be 11. The post treatment score was 4.45. The overall reduction in the MASI score after 8 weeks of treatment was 59.5 % ($p < .005$).



Additionally, VISIA analysis demonstrated an improvement in pore score of 14 %, improvement in wrinkles of 25 %, improvement in spot count of 22%, and improvement of texture of 75 %. The significant reduction in the MASI score, and overall improvement by VISIA analysis demonstrates the effectiveness of combination therapy including the Nd:YAG laser with a combination retinoid, hydroquinone, and flucinolone cream in the treatment of dermal and epidermal Melasma. In most of the patients treated, an almost immediate response to the epidermal Melasma was noted signifying the effectiveness of the soft peel. As expected however, the dermal component was more difficult to treat. It is clear from this study however, that combined treatment of Melasma can be safely and effectively treated with combination therapy as outlined.

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