OPEN ACCESS ISSN: 2837-3642 Galvan García HR, et al. (2024): 129
Doi: 10.47991/2837-3642/ACRCR-130

Research Article Annals of Clinical Reviews & Case Reports

Comparison of The Concomitant Use of the ND: YAG Q-Switch 1064 NM Laser in Picoseconds, ND: YAG Long Pulse Ultra pulse 1064 NM and IPL With and Without Shock Waves for The Treatment of Mixed Facial Melasma In a Mexican Population

Héctor Ricardo Galvan García[1*], Mariana González Torres[2], Yuvitza Ortiz Kuñasich[3]

[1]Hospital Dermatológico Dermoquirúrgica, Guadalajara, Jalisco, México
[2]Clínica Mtheory
[3]Hospital Especialidades Centro Médico Nacional La Raza Ciudad de México

[*]**Corresponding author:** Héctor Ricardo Galvan García, Hospital Dermatológico Dermoquirúrgica, Guadalajara, Jalisco, México. Email: doctorricardogalvan@hotmail.com

Citation: Galvan García HR, González Torres M, Ortiz Kuñasich Y (2024) Comparison of The Concomitant Use of the ND: YAG Q-Switch 1064 NM Laser in Picoseconds, ND: YAG Long Pulse Ultra pulse 1064 NM and IPL With and Without Shock Waves for The Treatment of Mixed Facial Melasma In a Mexican Population. Anna Clin Rev Cas Rep: ACRCR-130.

Received Date: 10 July, 2024; **Accepted Date:** 19 July, 2024; **Published Date:** 25 July, 2024

Abstract

Background: *Melasma treatment is a challenging dermatological condition. Photodynamic therapies combined with shock waves could provide a new way to get more efficient and satisfactory therapeutic results based on the theory of cell lysis through the effect of shock waves on damaged skin.*

Aim: *Compare clinical improvement of mixed facial melasma after Nd: YAG Q-switched 1064 nm picoseconds laser, ultra pulsed Nd: YAG long pulse and IPL 550 nm with and without extracorporeal shock waves.*

Patients and methods: *Two groups of patients were randomly selected. Treatment protocol in group A included IPL plus Nd: YAG long pulse laser and Nd YAG Q Switch 1064 nm without utilizing shock waves. Group B protocol combined photodynamic therapies plus extracorporeal shock waves between each laser modality. A total of 4 sessions were carried out with 4 weeks intervals between each one with a follow-up of 3 months after sessions were completed.*

Results: *The average age of the studied population was 51 years (47 to 57 years). In the evaluation carried out based on the photographs from the professional camera, the only participant in whom there was an observable change from group A was subject 02, who presented a 20% reduction in pigmentation; while for subjects 03 and 04 (group B), the reduction in pigmentation was 40% and 20% respectively. However, in the results obtained from the analysis of the images taken with the dermatoscope and the specialized camera, subject 02 presented a 40% reduction in pigmentation and a 20% reduction in the vascular component; Meanwhile, for subjects 03 and 04 (group B), the reduction in pigmentation observed was 60% for subject 03 and 40% for subject 04, referring to the vascular component it was 40% and 20% respectively. No serious adverse events occurred.*

Conclusions: *Shock waves are useful in multi-laser therapy for melasma, and their use does not entail risks that trigger significant adverse effects. These results establish foundations to continue studying the role of shock waves as concomitant therapy with laser equipment in mixed melasma.*

Shock waves are useful in multi-laser therapy for melasma, and their use does not entail risks that trigger significant adverse effects that could be grounds for prohibiting or contraindicating their use in patients with this pigment alteration.

Keywords: *Melasma, Laser Picoseconds, IPL, Shock Waves.*

Introduction

Melasma is one of the acquired, frequent and recurrent benign pigmentary diseases. It represents 4 to 10% of consultation reasons at dermatology services in Mexico. Starting from the theory of acoustilysis, shock waves have not only the ability to break the electromagnetic field that is generated secondary to the laser irradiation generating an exchange in the electrons of the atom, but also to improve blood and lymphatic circulation which results in the removal of pigment faster and more effectively with an effect local anti-inflammatory that reduces the risk of developing post-pigmentation inflammatory. To achieve this, the aim of this study is to compare the effectiveness of photodynamic therapies for the pigmentary and vascular component of mixed melasma with and without electromagnetic shock waves.

Material and Methods

For photodynamic therapies the following platforms were used Nd:YAG Q-switched 1064 nm in picoseconds (DiscoveryPico, Quanta System, Italy), Nd:YAG long pulse ultrapulsed 1064 nm (Skin clear SRVH, Wontech, Korea) and IPL (Nordlys, Candela Medical, United States).

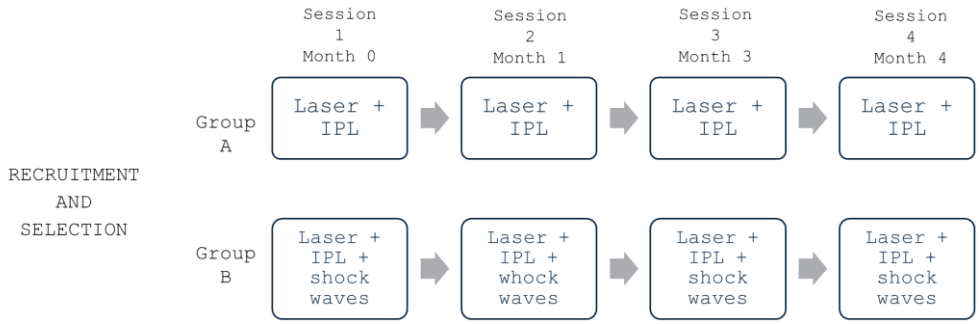
Four female subjects were recruited, with a diagnosis of mixed facial melasma, who had not received treatment for melasma in the two months prior to carrying out this study. Once the eligibility criteria were fufilled, they were randomly assigned into two groups (Figure 1):

Treatment protocol for group A:

1. IPL 555 nm 5ms at 2-5 J/cm2, pulse train of 3 in 45 ms delay, 2 to 5 full area passes until reaching endpoint
2. Nd:YAG Long Pulsed 1064nm spot 5 mm, pulse width 0.3 ms, 10 Hz, fluence 10-15 J/cm2, 300 to 500 pulses per treated area until reaching endpoint (mild erythema)
3. Nd:YAG Q-Switch 1064 nm picoseconds, spot 7 mm, fluence 0.7 to 0.9 J/cm2, 10 Hz, 100 to 150 shots only on the spot and until reaching the endpoint (mild erythema).
4. 5-minute delay between each modality mode was made.

Treatment protocol for group B:

1. Extracorporeal shock waves (Storz Medical) gun-type applicator, focused, white rubber tip, 1.8 energy, 18 Hz, 2000 to 3000 shots per area to be treated procedure was done at the beginning and as the last step of the protocol.
2. IPL 555 nm 5ms at 2-5 J/cm2, pulse train of 3 in 45 ms delay, 2 to 5 full area passes until reaching endpoint (mild erythema)
3. Nd:YAG LongPulsed 1064nm spot 5 mm, pulse width 0.3 ms, 10 Hz, fluence 10-15 J/cm2, 300 to 500 pulses per treated area until reaching endopoint (mild erythema)
4. Nd:YAG Q-Switch 1064 nm picoseconds, spot 7 mm, fluence 0.7 to 0.9 J/cm2, 10 Hz, 100 to 150 shots only on the spot and until reaching the endpoint (pink side).



Group results table there is group A, group B

At the end of each session, only facial cleansing and sun protection will be indicated every 4 hours. A total of 4 sessions will be carried out with 4-week intervals between each one and a follow-up 3 months after completing the protocol.

For evaluation of this clinical follow up standardized clinical photographs from the front, both profiles and by specific areas with a SONY A1 professional camera and with a camera specialized for assessment of pigments and blood vessels (Miravex), spectrophotometry and colorimetry (Cortex Technology) were taken.

Each of these measurements were took at beginning of the protocol, before and after each session (x4) and every month for 3 months after the end of the study as a follow-up.

Results

The average age of the studied population was 51 years (47 to 57 years), all research subjects attended four sessions on the scheduled dates except for subject 1 of group A, who missed one of the sessions.

Group A (Without shock waves)

- Subject 01 of group A: no decrease in pigmentation or vascular component is observed in the images taken with a professional camera (Figure 1), as well as in the images obtained by dermatoscope (Figure 1), and specialized camera (Figure 1).
- Subject 02 group A: in the professional camera photographs (figure 2), the observed decrease in pigment is slight, 20%, however, in the evidence using a dermatoscope and specialized camera, it is observed at the discretion of the medical team. , a reduction in pigment of 40% and 20% for the vascular component (Figure 2).

Group B (With shock waves)

- Subject 03 of group B: The improvement observed by the medical team in the photographs is 40% (Figure 3). While in the dermoscopic and specialized camera images, the improvement in the reduction of pigment is observed by 60% and by 40% in the vascular component of melasma (Figure 3).
- Subject 04 of group B: The images taken with a professional and specialized camera demonstrated a slight improvement of 20% for both components (Figure 4). In the images taken with a dermatoscope, improvement was observed in the decrease in the quantity and density of the pigment by 40% and the vascular component by 20% (Figure 4).

In both groups, mild erythema was observed at the end of each session, which subsided without the need for administration of topical or oral medications. No adverse effects were reported in the post-treatment.

Image analysis is carried out by subject and by group and the following was observed:

Figure 1: Subject 1 Group A.

Figure 2: Subject 2 Group A.

Figure 3: Subject 3 Group B.

Figure 4: Subject 4 Group B.

Discussion

Among the benign pigmentary diseases, we find melasma as a chronic, acquired, very frequent and recurrent pathology. It is an alteration of melanogenesis that presents as hyperpigmentation in areas of the body with greater sun exposure, predominantly on the face. Its diagnosis is purely clinical and is based on the finding of brown, asymmetrical, generally bilateral macules with a centrofacial, malar and mandibular presentation mainly [1, 2].

There are multiple treatment options, however, their approach must be individualized, and the patient must be educated about the use of broad-spectrum photoprotection, preferably mineral, to prevent this condition. Most of the therapeutics used aim to suppress the proliferation of melanocytes and inhibit the synthesis of melanin, block the formation of melanosomes achieving their degradation [3].

Laser treatments are a good alternative for those patients who have not improved after the use of conventional treatments and given that melanin can absorb a wide range of light of the electromagnetic spectrum (200 to 1200nm), multiple devices will be suitable for the treatment of melasma [4]. The best results have been associated with a combination of IPL with lasers such as Nd:Yag 1064 Q-switched to reach greater depth and thus complete treatment of epidermal and dermal melasma, thus observing a significant reduction in the MASI score. However, some complications have been reported, including leukodermias induced by the abuse of these lasers. It is imperative to continue the search for treatments that allow improvement of the pigment and the vascular component of the pathology to achieve better results.

In this study, the aim was to apply what was mentioned in the study by Michael S. et al. directed to the treatment of endogenous pigments found in dischromias such as melasma. Very variable results have been demonstrated after the application of light technologies in this condition. [5] The main complication reported is post-inflammatory hyperpigmentation, that's why the parameters used for this protocol were conservative. Mild transient erythema was the only side effect reported at the end of each session of this protocol, which improved in all cases after a few hours without the need to apply topical corticosteroids or any other type of treatment.

Extracorporeal shock waves are high-intensity mechanical waves (500–1000 bar) of a microsecond duration with a morphology characterized by a rapid positive phase followed by a negative phase. It is usually used in urology and orthopedic disorders. Now days it has been shown to have a positive effect in skin wound healing.

The main mechanisms of action on the skin its propose to participate in activation of lymphatic and blood drainage of the area to be treated, and on the other hand the rupture of the electromagnetic field formed by the change in the electrical charge of the electrons when the photoacoustilysis. effect occurs when the exogenous pigment particles fracture (tattoo ink) [6]. This facilitates the following passes of the laser, allowing disruption of pigment ensuring making this pigment small as possible to be phagocytosed and transferred to the via lymphatic and blood drained. [7,8].

In research subjects who received laser treatment combined with shock waves, a greater reduction in pigmentation was observed compared to subjects in group A, who received laser treatment alone. This may be because shock waves play an important role in facilitating pigment removal.

The only research subject who did not present a reduction in pigmentation was subject 01, to whom only the laser treatment was applied, following the parameters described in table 2. However, this may be since he was the only one subject who did not attend the four scheduled sessions and who missed eight weeks between the first and second sessions, instead of the four that were established in the protocol.

The results, despite demonstrating an apparent difference between both treatment schemes, as there was a greater reduction in pigmentation in the research subjects who received concomitant shock wave treatment with laser therapy, cannot be taken as conclusive, because it was an exploratory design in which the sample size was not calculated with adequate statistical power. However, it sets a precedent for the effectiveness of shock waves when combined with standard laser therapy.

Starting from this, this study aims to lay the foundations for the use of extracorporeal shock waves as an additional option for the treatment of melasma based on the photoacoustic effect of this technology against pigment.

Conclusions

The results of this protocol, despite being very limited to the size of the sample studied and the controls used, present a visible difference in the reduction of pigmentation between the two groups. The greatest reduction corresponds to the research subjects in group B, who received a treatment scheme with laser and shock waves. These results establish certain foundations to continue the study of the role that shock waves play as concomitant therapy with laser equipment and allow the development of more effective and safe treatment schemes for patients with mixed melasma.

Shock waves are useful in multi-laser therapy for melasma, and their use does not entail risks that trigger significant adverse effects laying foundations for the use of extracorporeal shock waves as an additional option for the treatment of melasma based on the photoacoustic effect of this technology against pigment.

Acknowledgement: We appreciatively acknowledge the center Dermoquirurgica, Guadalajara, Jal., University of Guadalajara, Jal., México.

Contribution authors: M.G.T. performed the research. Y.O.K. analyzed the data, collected the data and wrote the paper**.**

Conflict of Interest: There is no type of Conflict of Interest.

Reference

1. Kwon S-H, Na J-I, Choi J-Y, Park K-C. Melasma: Updates and perspectives. Exp Dermatol [Internet]. 2019;28(6):704–8. Disponible en: http://dx.doi.org/10.1111/exd.13844
2. Pawaskar MD, Parikh P, Markowski T, McMichael AJ, Feldman SR, Balkrishnan R. Melasma and its impact on health-related quality of life in Hispanic women. J Dermatolog Treat [Internet]. 2007;18(1):5–9. Disponible en: http://dx.doi.org/10.1080/09546630601028778
3. Sehgal VN, Verma P, Srivastava G, Aggarwal AK, Verma S. Melasm a: treatment strategy. J Cosmet Laser Ther [Internet]. 2011;13(6):265–79. Disponible en: http://dx.doi.org/10.3109/14764172.2011.630088
4. José Luis Cisneros Vela, Francisco M. Camacho Martínez, Mariano Vélez González. Láser en dermatología y dermocosmética. Madrid: Grupo aula médica; 2008.
5. Michael S. Kaminer, Christopher C.Capelli,Mona Sadeghpour. Increased Tattoo Fading in a Single Laser Tattoo Removal Session Enabled by a Rapid Acoustic Pulse Device: A Prospective Clinical Trial. Lasers Surg Med. 2022; 52: 70-76.
6. Ricardo Galvan Garcia, In Lu Chen. Combined Picosecond Laser Tattoo Removal with an Acoustic Shock Wave Device: A Case Series.Clin Case Rep J.2022;3(1):1-6.
7. Wong CSM, Chan MWM, Shek SYN, Yeung CK, Chan HHL. Fractional 1064 nm picosecond laser in treatment of Melasma and skin rejuvenation in Asians, A prospective study. Lasers Surg Med [Internet]. 2021;53(8):1032–42. Disponible en: http://dx.doi.org/10.1002/lsm.23382
8. Balu M, Lentsch G, Korta DZ, König K, Kelly KM, Tromberg BJ, et al. In vivo multiphoton-microscopy of picosecond-laser-induced optical breakdown in human skin: MULTIPHOTON MICROSCOPY OF LASER-INDUCED OPTICAL BREAKDOWN. Lasers Surg Med [Internet]. 2017;49(6):555–62. Disponible en: http://dx.doi.org/10.1002/lsm.22655.