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LASERS FOR ACNE, COMBINATIONS OF LASERS AND LIGHTS WITH MEDICAL THERAPIES

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Abstract
Acne has a multifactorial and complex etiology making therapies a challenge. Multimodality approach with oral topical retinoid and hormonal therapies constitutes the main framework of treating acne. Partial remission, incompliance, and adverse effects of medical therapies often increase demands of safe and fast therapies, especially, interventional therapies for acne. Interventional procedures comprising chemical peels and laser and light based devices constitute adjunctive treatments for acne and have gained some importance in the recent years.

Keywords: Acne, diode laser, erythema, hyperpigmentation, neodymium Doped Yttrium-aluminium -garnet Lasers, Pulsed Dye Laser.

Introduction

Lasers can benefit acne with or without photosensitizing agents. Photosensitizing molecules when used externally along with laser or light therapies have an additive and synergistic effect constituting the photodynamic therapy PDT.

Diode Lasers. The 1,450 nm diode laser has a low level of evidence for acne imrpovement. While treatments on face showed improvement in inflammatory acne but associated with pain while therapy, study on back acne have reflected prolonged improvement for up to 24 weeks. Erythema and hyperpigmentation is an adverse effect of this laser seen more in skin of color. Optimum regimens have not been standardized due to varied results with different settings and frequencies in studies and cotherapies with topical treatment modalities. Most studies have conducted an average of 8–10 sessions weekly over 3–4 months with treatment duration of 7–15 minutes.

Neodymium Doped Yttrium-aluminium -garnet Lasers. Inconclusive evidence is reported with treatment of acne lesions can be targeted by 1,320 nm neodymium doped yttrium-aluminium-garnet (Nd:YAG) laser to reduc open comedones with transient response.

Qausi-long Pulse 1,064 nm Neodymium Doped Yttrium-aluminium-garnet Laser. The high energy Nd:YAG laser treatment enables destruction of sebaceous glands as well as lysis of P. acnes, thus helpful for active acne lesions and also reducing seborrhea. The resultant effects show a long period of latency and treatments are best recommended softer gentle expression of acne lesions with expressor or alcohol swipes. The two randomized trials by Jung et al. and Cho et al. report clinical and histopathological benefits of combining long quasipulse diode along with Q-switched Nd:YAG assisted with topical carbon suspension added as a photodynamic agent. The author finds great reduction in acne lesions, especially inflamed acne lesions by using quasi long pulsed

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webofjournals.com/index.php/5

Nd:YAG laser and the 595 nm wavelength in an unpublished data of 15 patients. Combination of these at the same sessions has synergistic effects on treatment.

Pulsed Dye Lasers. Oxyhemoglobin as a target chromophore to improve acne has been a concept studied with use of the 585 nm PDL in randomized controlled trials. Reduction of 49% in acne lesions were reported by Seaton et al., but concomitant use of BPO was a protocol of this study thus reducing its validity. The studies reported mild improvement but good tolerance and minimal adverse effects in treated cases. Light therapy plus photosensitizers: exogenous photosensitizing agents when used in synergy with lasers and lights constitute PDT. Aminolevulinic acid, MAL, and ICG are used for PDT. They act by photochemical mechanism and they are metabolized to the porphyrins which are photoexcited by laser sources. Blue, red, and green lights can activate ALA and convert it to protoporphyrin IX. However, the hydrophilic ALA can penetrate with limited efficacy through cell membranes and interstitial spaces. Thus, its esterified form MAL, which is lipophilic than ALA, is used as a photosensitizer for its better penetration in acne lesions. After application, 3–4 hours are required for absorption of ALA and MAL into the sebaceous glands. Photodynamic therapy is conducted with light sources of continuous waveform like IPL or PDL after this contact time. The vehicle used and contact time of application determines the accumulation of the dye in the lesions in adequate amounts. This is followed by exposure to the continuous wave light sources, IPL and PDL. Multiple studies reveal acne lesions treated with PDT show decrease in severity of acne, significant decrease in P. acne populations, and sebum secretion compared to controls. The longevity of this clearance is reported around 10 weeks after a single treatment and up to 20 weeks with multiple treatments. Pain while treatment, flare of acne, itching, erythema, edema, hyperpigmentation, and exfoliation are the reported side effects. Indocyanine green dye has the ability to concentrate selectively in the sebaceous glands in a micro-emulsified form and can absorb at 800 nm wavelength making it a strong photosensitizer for PDT. Occlusion facilitates active accumulation of the dye in sebaceous glands and not only in the epidermis. While conducting PDT, the patient has to avoid sun exposure for about 48 hours afterward and thorough counseling is required. Further studies on the standard protocol of technique, strength, and contact time of formulations and duration of exposure of light sources are needed.

Combination of lasers and lights with medical therapies. As is crucial to long-term management of acne, the optical interventions in acne are used as an adjuvant and need concomitant medical therapies before, during, and after laser and light therapies to induce and maintain remission of acne lesions. The therapy comminuting topical and laser devices showed superior results in a shorter time interval than monotherapy with topical or lasers. Relapses were faster with monotherapy and maintenance of results were for more than 3 months in more than 50% patients. To effectively target comedones, topical retinoids and salicylic acid and cleansers are used with noticeable improvement reported in 80–90% of patients after the second treatment, with significant improvement in lesion counts after the fourth treatment (70–80% reduction in inflammatory lesions). Postprocedure care revolves around adequate sun protection and anti-inflammatory agents. Topical ant comedogenic and antiacne therapies can be continued. Lightening agents form a mainstay along with sun protection to prevent and alleviate the important squeal of postacne hyperpigmentation seen more abundantly in skin of color.

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webofjournals.com/index.php/5

Complications of optical therapies for lasers are few and include pain during therapy, transient flare, postinflammatory hyperpigmentation, and generally do not limit the use of laser applications. In conclusion, optical interventions with laser and light based devices are indicated as an adjuvant therapy along with medical therapy and are sought when one seeks faster clearance of inflammatory lesions which were unresponsive to medical therapies alone. The optical interventions for acne should always be followed by maintenance with topical therapies. Broadband lights, such as blue, red, and green lights, yield good response in multiple sittings and are safe to use even in dark skin types.

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