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Original Article

Systematic Review: Safety and Efficacy Comparison of Laser Therapy With And Other Resurfacing Technology

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ABSTRACT

There is an increasing demand of almost all young and adult population for the noninvasive cosmetic procedures specially to enhance the facial appearance and the requirement has expanded all over the world. This review was designed to identify and summarize the literature/evidence from different types of research/clinical studies conducted in facial resurfacing methodologies. A systematic review was designed and conducted in relation to facial resurfacing and rejuvenating techniques using data from PubMed, MEDLINE Cochrane database and Scopus. Systematic review protocol guidelines were used for research questions, aim of the review and PICO breakdown, eligibility criteria and used search engine and extraction of data. A minimum of 17 clinical studies and reviews were identified including randomized clinical trials. Significant results have been obtained in some clinical trials about techniques of rejuvenation and some studies have elucidated contrasting evidence. In most of the work, ablative and non-ablative laser therapy had been compared and we found that some results were compatible, and others showed contrasting evidence. In conclusion, more high-quality randomized control clinical trials are needed to decide on better safety and effectiveness of ablative or non-ablative laser therapy vs conventional treatments.

Index Terms- Laser Therapy, Face Resurfacing Technology

INTRODUCTION

Esthetic skin procedures have become a more demanded area among the younger generation of the world. There is a wide range of available techniques used for skin resurfacing [1]. Skin resurfacing treatment will mainly focus on the skin complexion and removal of the top layer of the skin [1,2]. Our literature survey showed that this enhancing complexion procedure can be done by different methods [1-5]. In this review process, we concentrate on reviewing the therapeutic efficacy and safety of different types of laser technology, chemical peeling in rejuvenation and other methods which are also used in the practice. In all studies, objective of the facial resurfacing is mainly to remove of top layer of the skin by damaging the skin layer to regenerate the new young cells [3] All methods which are used currently, reduce fine and coarse wrinkles, fine lines, age specific spots and other blemishes [5,6]. Demand for rejuvenation is now more common among adult and aged generation in all over the world and had made their appearance of the face and neck drastically [6]. Some research findings showed that individual facial assessment is mandatory before the commencement of the therapy while some others have not given any data about the pretreatment evaluation. The safety, efficacy and post treatment complications have been compared and studied only in few studies [7,8].

CURRENT TREATMENT MODALITIES

Before the laser resurfacing, soft tissue fillers like fat, collagen or hyaluronic acid are commonly injected into wrinkled area in both neck and face [7,8,9]. With the practice of facial filling, research evidence showed that hyaluronic acid, calcium hydroxypaptite, fat is commonly used with safety [7,8]. Further, clinical trials showed that effective time duration of facial filling last for 6-12 months and repeated treatment therefore is required to regain the appearance when compared to the lase therapy [7,9,10]. Goldman *et al* with his research group had found out that there is no significant difference in the treatment groups of facial filling alone and facial filling followed with laser treatment on face [9]. In contrast, Fernando *et al* had

published a paper with a result of the concomitant use (same day) of laser and HA fillers for facial rejuvenation represents an effective and safe strategy which improves clinical results and patient's satisfaction [10]. This shows contradictory results a decision on the effectiveness and safety of combination filler/laser treatments [10]

CHEMICAL PEELING

Chemical peeling has been practiced on the face to remove the dead upper layer of the skin and stimulate the rejuvenation of the new skin cells [10]. Chemical peels are different types, and superficial and medium peels will improve the skin texture wrinkles and pigmentation and recovery will be smooth. Deep peels are used for more severe dermatological conditions and may results in swelling and blisters after the treatment[11]. Review published by Hesham *et al*, had identified that there is no difference in fractional erbium YAG with glycolic acid peel in facial treatment [11]. In support to this finding, Hassan *et al* also had conducted comparative study on CO_2 laser and chemical peeling and found out the high concentration of fractional CO_2 laser and chemical peeling had shown equally effective results in treatment of acne vulgaris [12]. But they specifically highlighted the fractional CO_2 laser is superior to mandelic acid chemical peeling in treatment of post acne scars even in high concentration [12]

MECHANISM OF LASER FACIAL RESURFACING

Different types of lase therapy is used to rejuvenate the skin in cosmetic industry to enhance the tone, texture and reduce pigmentation of the skin. Laser therapy uses the process of photothermolysis which will release a beam of light energy to the affected area of skin, and this will destroy the outer layer of the skin, which is epidermis. Laser beams cause heating of water at epidermis and vaporize the tissue to get filled by collagen fibers. The wavelength of the light must be chosen as per the color and the shape of the target area [3,5]. With this treatment, stimulation of dermis will be commenced with cellular and tissue repairing and collagen production. This revitalization procedure will make smooth and youthful appearance of the person [3-5].

As per the published reports in this study, we found that laser therapy is collectively used in removing a wide variety of scars in addition to the wrinkles [5]. Most of the studies identified that minimum recovery time is one of the advantages of laser treatment. Patients can resume day to day activities after the session and it has been recorded for the treatment of acne, birth marks, excessive hair growth problems, sagging skin conditions age related pigmentations and lesions, vascular lesion which are cosmetically affected, wrinkles and age spots and most importantly the precancerous lesions [3-6].

DIFFERENT TYPES OF LASER THERAPY

Laser therapy uses different types of lasers such as Erybium, CO_2 and dry lasers**.** There are two main types of ablative and non-ablative laser therapy**.**

Dermatologists and clinicians use fractional CO_2 lasers which are a mixture of 3 gases of 10-20% CO_2, 10-20% nitrogen and Helium. This is noninvasive and removes the damaged and aged skin and stimulates collagen formation and result in firm and health young skin. Erbium laser resurfacing has been done to remove surface level, deep lines and wrinkles. This has become popular due to the minimum burning of surrounding tissues [1,2,4]. If the skin is dark, treatment with Neodymium YAG has been considered because it has a longer wavelength that goes deeper into the skin effectively bypassing the melanin in the upper layer of the skin [2-4]

Many randomized control trials were reviewed to find out the best resurfacing technique [1-17]. Reviews articles were also studied and multiple authors in review articles had advocated improving the study designing and quality in future. [13,17]. In relation to the safety and efficacy, 1540-nm fractional erbium glass laser in the non-contact mode had been identified as safe and effective treatment for facial photodamage [15]. In addition to that another clinical trial showed that treatment of photodamage with a fractionated 1927-nm nonablative thulium laser is a promising new therapeutic option [16] and showed that two treatments with a 1927nm non-ablative fractionated thulium laser produced moderate to marked improvement in overall appearance and pigmentation with high patient satisfaction [16]. The response to treatment has been maintained for

three months follow up [16,17]. Another method of treatment for aging skin was identified as photo rejuvenation. Phototherapy had been very successful in controlling the regular pigmentation effectively. Light emitting diode (LED) is identified as novel light source and effective in wrinkles skin laxity. Yoon lee et al had conducted a prospective randomized double blind, split face clinical study and recommended that molecular level reactivation of skin rejuvenation with LED treatment and its safety [22,23].

A study conducted by Christopher *et al*, found out that techniques supported with artificial intelligence is much better than traditional methods of results of facial rejuvenating and resurfacing [24]. Review published by Macrene *et al* had suggested that multi-center clinical trial evidence for the better safety and efficacy with the fractional carbon dioxide laser treatment [25]. In contrast Yang *et al researched* that both nonablative fractional laser and ablative CO_2 fractional laser are effective and safe treatment for striae distensae of Asian skin. They further recommend that neither of treatment showed have not shown any greater clinical improvement than the other treatment. [26]

Considering all above research work and their evidence, treatment modalities for facial resurfacing had resulted different in individual work and vary with the type of the disease and the facial presentation. Article published in Journal of cosmetic and laser therapy by Fereshtech *et al* had identified that safety/efficacy and cost effectiveness of CO_2 fractional laser therapy in comparison to other methos of rejuvenation is high [18]. Cost for the treatment modalities had varied with the treatment type for the type of skin lesion. Farnoosh *et al* found out that the efficacy and safety of ablative laser were not higher than those of non-ablative laser in skin rejuvenation [19] Most importantly, minim invasion and permanent skin solution are the main reasons for the popularity of the laser skin treatment with very impressive results.

RECOMMENDATIONS

As per the finding with the former research and review articles, we only can recommend the performance of laser-based resurfacing is considered as safe and efficient method of making expected skin appearance only with the hands of highly trained, knowledgeful professional.

Therefore, when you decide for laser skin resurfacing, with this study, we recommend discussing with the cosmetic surgeon o dermatologist about your focus on the treatment goals and the existing skill problem which you want to address and the expected results. In relation to efficacy and safety, considering all the above research work published, we identified contrasting results for recommending ablative laser and non-ablative laser therapy. Therefore, we need more high-quality randomized control clinical trials to decide on the safety and effectiveness of ablative or non-ablative laser therapy vs conventional treatments.

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