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Is Ablative Fractional CO₂ Lasering Effective at Reducing the Appearance of Moderate to Severe Atrophic Acne Scars as per Patient Reports?

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A Selective Evidence Based Medicine Review
In Partial Fulfillment of the Requirements For
The Degree of Master of Science

In

Health Sciences-Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Philadelphia, Pennsylvania

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Abstract

Objective: Is ablative fractional CO₂ lasering effective at reducing the appearance of moderate to severe atrophic acne scars?

Study Design: Review of published articles including one randomized controlled trial with blinded response evaluation, one randomized split-faced clinical study and one clinical trial were used for this review and were selected based on their relevance to the clinical question.

Data Source: The most recent trials examining ablative fractional CO₂ lasering for the treatment of moderate to severe atrophic acne scars were found using PubMed.

Outcome Measured: Patient reported reduction in the appearance of atrophic acne scars was the outcome measured.

Results: Hedelund et al. demonstrated that postoperatively the laser treated skin appeared more even and smooth compared to untreated controlled sites. Patients were satisfied with treatments and satisfaction scores were similar at 1 month, 3 months and 6 months postoperatively $p=0.117$. Scar texture was evaluated by patients to be mild to moderately improved at 1 month, 3 months and 6 months postoperatively and the scores were not statistically different over time $p=0.629$. Qian et al. demonstrated that at 12 months after fractional CO₂ laser treatment 12.9% of patients had an excellent response, while 38.71% showed a good to fair response. Zhang et al. demonstrated that both fractional CO₂ laser treatment and fractional microplasma RF treatment had an equivalent effect. After treatment with fractional CO₂ laser 60.6% of patients were very satisfied to satisfied, while after fractional microplasma RF laser treatment 66.7% of patients were very satisfied to satisfied.

Conclusions: As per patient reports, atrophic acne scarring can be mildly to moderately improved with the use of ablative CO₂ fractional laser treatment.

Key Words: Acne scarring, fractional CO₂ laser

Introduction

Atrophic acne scars are a common complication of acne vulgaris, they can be permanent and are associated with significant psychological stress.¹ Acne scars are the result of inflamed pimples which are caused by pores clogged with excess oil, bacteria or dead skin cells.² The swelling of the pore causes a break in the follicle wall, the skin then attempts to repair these lesions by forming new collagen fibers.² When the skin repairs itself it is not as smooth or flawless as the original skin. This paper evaluates three different types of studies; one randomized split face study, one randomized controlled trial with blinded response evaluation and one clinical trial study which assess the efficacy of ablative fractional CO₂ laser to treat atrophic acne scars.

95 percent of patients with acne vulgaris will develop atrophic acne scars. Acne scars have been linked to suicide, poor self-esteem, depression, anxiety and unemployment.³ Research suggests that a large amount of money is spent per year on treatment of acne scars. Although many patients who suffer from acne vulgaris end up with significant acne scarring, the exact amount of visits is unknown.

Acne scars are caused by inflammatory acne. Atrophic acne scars can be caused due to deeply penetrating acne; the body does not produce enough collagen when trying to heal the acne causing an atrophic scar.² Atrophic scars occur as well defined lesions which are depressed. Abnormal collagen production can cause irregularities in the texture of the skin as well as poor healing.² Many factors play a role in how a patient's skin will scar including size and depth of the wound, heredity, age and ethnicity.⁴ Currently there are treatments that exist for acne scarring, however none of these treatments fully remove these scars. Some of these treatments include acne scar surgery, dermabrasion, micro-dermabrasion, chemical peels, collagen fillers,

hyaluronic acid fillers and fat fillers.⁵ Acne scar surgery is a treatment used to make a scar look less noticeable by bringing it closer to the surface or by breaking up the scar tissue.² These types of procedures are best for treating a few depressed acne scars. Resurfacing procedures such as microdermabrasion, chemical peels and dermabrasion remove layers of skin which allows the body to create new skin cells.² Resurfacing techniques work best for depressed acne scars that are not too deep. This treatment is also useful in contouring the scar edges to make them less noticeable. Skin filler treatments are useful to treat a few depressed acne scars. The dermatologist can fill the depressed scar with collagen, fat or hyaluronic acid, by doing this the scar will be plumped up. The results may only last for 6-12 months and may need to be repeated.⁵ All of these treatments have pros and cons and are not always effective. The objective of this selective EBM review is to determine whether or not ablative fractional CO₂ lasering is effective at reducing the appearance of moderate to severe atrophic acne scars.

Methods

This review focus on patients that are greater than 18 years old, who have had atrophic acne scars for over one year. The intervention studied was the treatment of atrophic acne scarring with an ablative fractional CO₂ laser. Hedelund et al. asked patients to rate their scars post-operatively on a scale of 0 (perfectly even) to 10 (worse).¹ Zhang et al. patients were asked to give feedback six months after the final treatment reporting their overall satisfaction level as either very satisfied, slightly satisfied or unsatisfied with separate evaluations for each side of their face.⁶ Qian et al. asked patients to rate their scars post-operatively as poor, fair, good or excellent.⁷ Although many outcomes were measured in these studies, the main outcome of concern was the patient's interpretation of whether or not there was an improvement in their skin. There were three different types of studies used in the selective EBM review; one

randomized controlled trial with blinded response evaluation, one randomized split faced clinical study and one clinical trial. Inclusion criteria included recent studies that were randomized controlled trials or clinical trials addressing the use of ablative fractional CO₂ laser as treatment for moderate to severe atrophic acne scars. Exclusion criteria included patients younger than 18 years of age, or patients with atrophic acne scars for less than one year. PubMed was the database accessed to search for these articles and the keywords included acne scarring and fractional CO₂ laser. Each article was published in a peer reviewed journal and was written in English.