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Original Article

Efficacy and safety of ablative fractional carbon dioxide laser for acne scars

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Abstract

Background Acne may lead to long term squelae including physical scars. Lasers have been used with variable degree of success but literature pertaining to Asian population is sparse.

Objectives To evaluate the efficacy and safety of carbon dioxide (CO_2) fractional laser in the treatment of acne scars in the local population.

Patients and methods Twenty patients with mild to moderate atrophic acne scars were registered and subjected to monthly fractional CO_2 laser resurfacing for six sessions and final evaluation was done six months after the last treatment.

Results More than 71% patients showed variable degree of improvement. No severe long term complications were noted in any patient.

Conclusion Study suggests that CO_2 Fractional laser may prove a useful addition in the management of acne scars in our patients as well.

Key words
Acne scars, fractional CO_2laser.

Introduction

Acne is a common skin condition specially in adult age group.[1] Its course varies according to its severity, mishandling and management.[2] Acne scars are quite common and lead to disfigurement and psychosocial problems.[3,4]

There are several classifications of acne scars. A recent, comprehensive and functional scheme was proposed, whereby scars are classified as rolling, ice-pick, shallow boxcar, and deep box-car. Rolling scars are gently undulating, appearing like hills and valleys without sharp borders. Ice-pick scars, also known as pitted scars, appear as round, deep depressions culminating in a pinpoint base; in cross-section, they are shaped like a 'v.' Boxcar scars have a flat, 'u-shaped' base. Broader than ice-pick scars, they are round, polygonal, or linear at the skin surface. Shallow boxcar scars terminate in the shallow-to mid-dermis, and deep boxcar scars penetrate to the reticular dermis.[5]

Various procedures like chemical peeling, dermabrasion, laser resurfacing, punch excision, punch elevation and scar revision may have to be sorted to improve the appearance with variable results and outcomes.[4,5]

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Ablative laser therapies with CO_2 fractional laser and erbium-doped yttrium aluminum garnet (Er:YAG) lasers are well accepted treatments for post acne scars.[6] Use of these lasers in Asian patients was discouraged due to delayed recovery time, edema, prolonged erythema, post-inflammatory pigmentations and scarring.[7,8]

In this study, we examined the efficacy and safety of ablative CO_2 fractional laser, (10,600 nm) in 20 patients with mild to moderate acne scars.

Patients and methods

Twenty patients (17 females and 3 males), mean age 23 years (21-34 years), Fitzpatrick skin type IV and V with mild to moderate acne scarring were enrolled from skin clinic at Cavlary Hospital and Laser Center at MM Alam road, Lahore, and treated with ablative CO_2 fractional laser of 10,600 nm wavelength, Max 7000®, Korea.

The laser fluence was delivered with settings of 10 to 20 mJ/cm^2,density level of 2 to 3, using the deep resurfacing mode. In order to reduce inflammatory reactions and edema, 1% hydrocortisone cream was applied after laser application, and topical sunblock with SPF 60 was advised throughout the daytime.

Those who had any procedures such as chemical peeling or dermabrasion done before and those on oral or topical retinoids were excluded.

Patients were informed about the procedure, likely complications and outcomes. A written consent was mandatory, and photographs were taken before and after each sitting of laser.

No topical or local anesthetics were used, only concomitant and post laser superficial cooling of the treated area was done by chilled air and every patient was treated for six sittings each a month apart.

Evaluation was done before and after each treatment and recorded on a specially devised pro forma with a quartile grading scale (**Table 1**) as grade 1: <25%, minimal to no improvement; grade 2: 26-50%, moderate improvement; grade 3: 51-75% marked improvement and grade 4: >75% (up to above 95%).

Results

On completion of study, sixteen patients were available for evaluation. All of them had improvement in their acne scarring but of variable grade. Two of the patients showed almost clearance of scarring (grade 4) [**Figures 1** and **2**], while a large number (13 patients) showed mild to moderate healing of acne scars (**Figures 3** and **4**). An average improvement of 71% was observed; details are given in **Table 2**.

Side effects (14 patients) included mild pain or burning during laser treatment, post-treatment crusting, scaling and transient pigmentation. Twelve of sixteen patients showed mild erythema which was transient and recovered at its own. Two of these had hyperpigmentation

Table 1 Grades of improvement

Grade	*Percentage improvement*	*Remarks*
Grade I	0-25%	Minimal or no improvement
Grade II	26-50%	Moderate improvement
Grade III	51-75%	Marked improvement
Grade IV	>75%	Near total improvement

Table 2 Summary of patients who completed study

Patient No.	*Age (years) /Sex*	*Scar severity*	*Improvement Grade*	*Complications*
1	21/ M	Moderate	Grade III	Mild erythema
2	23/ F	Mild	Grade IV	Erythema edema
3	27/ F	Moderate	Grade II	Transient erythema
4	24/ M	Moderate	Grade III	Transient erythema, mild pigmentation
5	21/ F	Moderate	Grade III	Burning for 3 weeks
6	25/ F	Moderate to severe	Grade II	Transient erythema
7	26/ F	Moderate	Grade III	Transient erythema, scaling for 10 days
8	19/ F	Moderate	Grade IV	Transient erythema
9	28/ F	Moderate	Grade III	Transient erythema
10	22/ F	Moderate	Grade III	Scaling
11	34/ M	Mild to moderate	Grade III	Edema, scaling pigmentation
12	20/ F	Moderate	Grade III	Transient erythema
13	22/ F	Moderate	Grade III	Burning scaling
14	20/ F	Moderate to severe	Grade II	Scaling, edema pigmentation
15	26/ F	Moderate	Grade III	Transient erythema
16	21/ F	Moderate	Grade II	Transient erythema

Figure 1 Acne scars before treatment (patient 1).

Figure 3 Acne scars before treatment (patient 2).

Figure 2 Acne scars after six treatments with CO_2 laser (grade 4 improvement).

Figure 4 Acne scars after six treatments with CO_2 laser (grade 3 improvement).

and only one case was prescribed anti-pigmentation cream. However, this did not warrant discontinuation of treatment.

Discussion

Atrophic acne scarring occurs because of the impaired resolution or healing of damage caused in and around pilosebaceous follicles during active inflammation.[9,10] These scars are usually classified according to the shape and depth as ice-pick, rolling, and boxcar scars.[5]

They often involve deeper structures and draw in, surface layers to cause indention or atrophy. Although laser skin resurfacing has revolutionized the treatment of atrophic acne scars, they still present a substantial therapeutic challenge. Ablative laser resurfacing using CO_2 or Er: YAG lasers has efficacy of 25% to 90% for treating acne scars and it is considered the gold standard.[7] However, postoperative erythema, infection, scarring, and pigmentary alteration are not uncommon complications.[5] In particular, postoperative hyperpigmentation, although usually transient, is relatively common in patients with darker skin types.[7,8]

No such study on the efficacy and safety of fractional ablative CO_2 fractional laser for the treatment of acne scars has been previously conducted in the country (not in the published literature). In the present study, most of the patients showed 25% to75% improvement. This gives us confidence in recommending the use of CO_2 fractional laser as an alternate tool for treating acne scars, where this facility is available.

Conclusion

W suggest that ablative CO_2 fractional laser may be a useful tool in treating atrophic acne scarring in our patient population, with minimum complications, if at all they happen, where this facility is available.

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