

# EFFECTIVENESS OF CARBON DIOXIDE LASER IN POST ACNE SCARRING PROSPECTIVE INTERVENTIONAL STUDY FROM KHYBER PUKHTUNKHWA

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## ABSTRACT

**Background:** Post acne scars is a distressing condition for patients. Lasers have been used with variable degree of success but studies regarding their efficacy and safety are very few in local population.

**Objectives;** To determine the effectiveness of carbon dioxide (CO<sub>2</sub>) fractional laser in the treatment of post acne scars in the local population.

**Patients and methods:** Forty patients with mild to moderate atrophic acne scars were registered and subjected to monthly fractional CO<sub>2</sub> laser resurfacing for four sessions and final evaluation was done three months after the last treatment.

**Results:** In 21 grade 3 and 4 response was seen. Of these 21 responders, there were 5(12%) patients in whom >75% improvement was seen in scars and skin texture while in 17(43%) patients, the improvement was in the range of 51-75%. While 6(15%) patients failed to demonstrate any significant response to treatment with <25% improvement on the quartile scale.

**Conclusion:** Carbon dioxide Fractional laser demonstrated efficacy in the treatment of post acne scars particularly the rolling scars.

**Key Words:** Acne scars, fractional carbon dioxide laser, Post acne scars.

## INTRODUCTION

Facial acne scars occur as a sequelae of severe acne during the teenage years. Scarring occurs in upto 95% of acne patients<sup>1</sup>. Patients seek treatment for the disfigurement caused by past episodes of acne. Two main types of scars form as a result of past episodes of acne, atrophic and hypertrophic. Its atrophic acne scars which have been subject of interest regarding treatment.

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 boxcar<sup>2,3</sup>. 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.<sup>4</sup>

Various treatment modalities, alone and in combination, have been used to treat atrophic scars, including dermabrasion, excisional surgery with closure punch grafting and elevation, collagen implants, silicone injections, chemical peeling, and laser resurfacing<sup>4</sup>. Each of these treatments have been limited by side effects, most notably, scarring and pigmentary changes<sup>5,6</sup>.

With the development of high energy pulsed carbon dioxide (CO<sub>2</sub>) lasers that minimize thermal injury to uninvolved adjacent tissue structures, the risk of complications following laser treatment can be significantly reduced. The aim of this study was to evaluate the efficacy of fractional CO<sub>2</sub> laser in the treatment of moderate to severe atrophic acne scars<sup>7</sup>.

## MATERIALS AND METHODS

This prospective interventional study was conducted from October 2012 to December 2013 in a private clinic after obtaining approval from Hospital ethical committee of Lady Reading Hospital, Peshawar. Forty consecutive patients suffering from mild to moderate atrophic acne scars were enrolled in the study by non probability convenience sampling.

All the data regarding age, gender, skin type and type of acne scars was recorded on specially designed proforma. Informed consent was taken from all the patients and procedure was explained to the participants of the study.

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The treatment areas were cleansed, by using a mild cleanser and 70% isopropyl alcohol. Local anaesthetic cream (EMLA) was applied on the entire face. After an hour of application, the anesthetic cream was gently removed with a swab soaked in normal saline. We used Korean Fractional Carbon dioxide laser unit for the purpose of treatment of post acne scars. The laser was calibrated at 40 Watts (60 percent) pulse duration 3msec frequency 3 msec and distance between spots 1.2mm. Patients suffering from active infections, history of keloidal scar formation, recent use of isotretinoin and pregnant ladies were excluded from the study.

All the patients received four sessions of fractional carbon dioxide resurfacing four weeks apart depending on the response. Primary endpoint of treatment was considered as 50 percent reduction in Physicians Global scoring and Patients satisfaction score.

Photographs were taken before, at each visit and on completion of treatment using identical camera settings, lighting, and patient positioning. Two dermatologists independently compared the digital photos for clinical evaluation of acne scars after completion of treatment. The response to treatment was graded as Fair 25% reduction in acne scars, Good as 26 to 50% reduction in acne scars, Very Good 51 to 75% reduction and Excellent as 76 to 100% reduction in acne scars. Treatment was considered failure if there was no response to treatment after three treatments. Treatment endpoints were determined by relative effacement of the scars or the appearance of yellowish discoloration within the laser-irradiated tissue.

Immediately following treatment, a topical antibiotic (Polyfax) ointment was applied. The patient was instructed to gently rinse the face with cool water several times daily, followed by antibiotic ointment application. Ice packs and diclofenac sodium were prescribed for the first 24-48 hours to reduce swelling and discomfort.

All patients received prophylactic oral Acyclovir for 1 week. Patients were evaluated at 7 days postoperatively at which time any residual coagulated debris was cleansed with gauze soaked in saline. All patients were able to apply sunscreen and camouflage make-up with instruction by 7-10 days postoperatively. Data was analyzed using SPSS 20. Variables such as age, duration and gender shall be analyzed.

## RESULTS

There were total of 40 patients included in the study. There were 17 males and 23 females in the study. Mean age of the participants was 25.5 years + 3.5 SD. Three patients had skin phototype 2, 29 patients had skin phototype 3 and 7 patients had skin phototype 4. Duration of acne scars was 2.5 years+ 1 SD.

At the three months follow-up visit after the last laser session, a positive response on quartile scale was documented. In 22 grade 3 and 4 response was seen.

**Table S**

Photo-type	Physician grading				Total
	0-25	26-51	51-75	76-100	
Type 2	0	1	2	0	3
Type 3	3	9	13	5	30
Type 4	3	2	2	0	7
Total	6 (15%)	12 (30%)	17 (43%)	5 (12%)	40

Of these 22 responders, there were 5(12%) patients in whom >75% improvement was seen in scars and skin texture while in 17(43%) patients, the improvement was in the range of 51-75%. While 6(15%) patients failed to demonstrate any significant response to treatment with <25% improvement on the quartile scale. Patient satisfaction survey revealed that about 73% (36 cases out of the total of 40) were satisfied with the treatment results. For the remaining 4 cases, the improvement achieved was not up to their expectations.

In general, rolling scars were seen to respond the best to fractional laser resurfacing therapy while icepick pitted scars responded the least. Almost all of the rolling scars showed excellent response to treatment and all the 5 patients who showed >75% improvement in scars had predominantly rolling type of scars. On the other hand, patients who achieved the minimum improvement score had predominantly ice-pick scars or deep boxcar scars on their face.

## DISCUSSION

Laser resurfacing with CO2 laser produces excellent results when used in the treatment of aging skin and acne scars. Fractional laser technology treats a 'fraction' of the whole skin and the integrity of epidermis is not compromised. As each microscopic wound created by the laser device is surrounded by normal, healthy tissue, the healing is rapid and the adverse effects are reduced to a considerable degree.

A number of clinical studies have documented a positive therapeutic effect of ablative fractional laser resurfacing with CO2 laser. A study conducted by Tahir Jamil et al achieved 71% improvement in acne scars. No significant adverse effects or prolonged down-time after the procedure were seen. In our study out of 22 patients showed 51-75% response which are comparable to results achieved by Tahir Jamil et al.<sup>8</sup>

In Asian patients, Sung Bin Cho and co-workers demonstrated the efficacy as well as safety of fractional CO2 laser resurfacing in acne scars.<sup>9</sup> Half of the 20 patients enrolled in this study achieved clinical improvement of >50% while another 7 patients achieved 26-50% improvement. In our study 22 out of 40 achieved >50% improvement while 12 patient achieved 26-50%.

In our study, we used energy in the range of 40 watts 60% pulse duration 3msec frequency 3 msec and distance between spots 1.2mm. These treatment parameters were decided on the basis of the skin type of our patients as most of them had Fitzpatrick skin type 3 or 4. We treated all individual scars with the same laser fluence and treatment density irrespective of their depth or morphological type. Good to excellent response was achieved in about 22 patients on the quartile grading scale. This figure is in conformity with the figures quoted in most of the studies on CO2 fractional laser resurfacing in acne scars.<sup>9,9,11,12,13</sup>

Adverse effects seen were not significant and none of the enrolled patients had any long-term or permanent side effects from the procedure. However, there is certainly some down-time associated with fractional CO2 laser resurfacing as patients do experience crusting for a few days after the procedure. This crusting makes it impossible for patients to resume their normal work for a few days after each laser session.<sup>14</sup>

Rolling scars were seen to respond the best while icepick pitted scars responded the least to treatment in the study population<sup>15,16</sup> same as in our study. It is of paramount importance that patients are counselled regarding the results of treatment and realistic picture should be made in front of them. This particular aspect was explained to the patient by asking him/her to gently pull the facial skin and feel the difference in scars. All cases must be photographed and documented as patients expectations and observations do not match the Physicians assessment. The pictures documented help in resolving this particular disparity in the observations to great extent.

## CONCLUSION

Fractional carbon dioxide laser is effective in Atrophic acne scars Rolling scars respond well to the treatment.

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