

A Comparative Study of Efficacy of Fractional CO₂ Laser vs Microdermabrasion in Treatment of Acne Scars (Total 100 Patients)

Jinali Makwana¹, Deval Vora², Vijay Soyals³

^{1,3}Third Year Resident, ²Professor and Head, Skin and VD, M.P. Shah Medical College, Jamnagar

Corresponding Author: Jinali Makwana

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ABSTRACT

Introduction: Acne vulgaris is a common disease affecting pilosebaceous unit that can lead to significant scarring. Fractional CO₂ Laser and microdermabrasion are effective non-surgical treatment modalities for acne scars.

Aims and objectives: To study and compare the efficacy of fractional CO₂ Laser and microdermabrasion therapy in acne scars.

Material and methods: Total 100 patients were selected in our study. 50 patients were allotted into each group. Scar grading assessment was done by Goodman and Baron qualitative scar grading system.

Result: 50 patients were taken in each group. There was a significant improvement in grading of acne scars at the end of 6 months of treatment. On comparison of fractional CO₂ Laser with microdermabrasion, p-value was <0.05 that is significant.

Conclusion: Fractional CO₂ Laser showed better improvement in grading of acne scars than microdermabrasion, though none of these treatments are 100% effective in treating acne scars.

Key words: Acne scars, fractional CO₂ laser, microdermabrasion, Goodman and Baron grading.

INTRODUCTION

Acne vulgaris is a common skin disease presenting as non-inflammatory lesions, inflammatory lesions and varying degree of scarring, affecting mostly the face but also the back and chest. Acne leads to

significant morbidity that is associated with residual scarring and psychological disturbances such as poor self-image, depression, and anxiety, which leads to negative impact on quality of life.^[1]

Acne scars can be classified into three main categories depending on whether there is a net loss or gain of collagen: atrophic, hypertrophic and keloidal scars respectively. Atrophic scars can be further sub-classified into ice pick, rolling, and box scars. Scars classification is important to guide treatment options.^[2]

There are different treatment options like chemical peels, microdermabrasion, laser-ablative and non-ablative lasers, fractional photo thermolysis, radio frequency, punch excision, punch elevation, tissue augmenting agent, microneedling, subcision etc.^[3]

Microdermabrasion is a superficial office based minimally invasive technique of mechanical abrasion of the skin using pressurised stream of particles such as aluminium oxide crystals. It may also be performed with disposable or reusable diamond tip. There is superficial damage of the skin followed by epithelialization, stimulation of epidermal cell turnover and it also cause stimulation and remodelling of dermal collagen^[4]. Introduction of fractional technology CO₂ laser has recovered its main role in treatment of acne scars. The concept is of fractional photo thermolysis-treating zones in the epidermis and/or

dermis while leaving some areas untouched following a grid pattern. These intact areas located between the treatment zone helps to lead faster re-epithelialization^[5].

Fractional Co2 laser is now well established in scar management as it provides superior results and lower side effects to conventional ablative lasers^[6,7,8].

MATERIAL AND METHOD

The aim and objective of this study is to compare of efficacy of fractional CO₂ laser and microdermabrasion therapy in acne scars and to evaluate the outcome of the treatment of acne scars.

Inclusion criteria

1. Patients attending skin OPD regularly.
2. Patients who came for regular follow up.
3. Age group is between 15-40 years irrespective of sex.
4. Who gave verbal and informed consents were included in the study.

Exclusion criteria

1. Patient with unrealistic expectations
2. Pregnant and lactating women
3. History of photosensitivity
4. History of keloidal tendency.
5. History of herpes labialis
6. Patients who did not give consent
7. Patient not ready for photo protection

Study design

The study was conducted over a period of two years from July 2019 to August 2021 at department of skin of G.G Govt. hospital after obtaining clearance from institutional ethics committee. Patients fulfilling inclusion criteria were enrolled in the study.

A written informed consent was obtained from each patient before recruitment and then allotted into two groups randomly.

For fractional Co2 laser, prior to treatment topical anesthetic cream

containing prilocaine and lidocaine was applied under occlusion for 1hr.

Parameters:

- Distance: 1.2mm
- Duration: 3.0ms
- Power: 15W
- Energy: 45mj

The acne scars to be treated were identified and marked with markers. Treatment parameters were programmed in the laser system detailed above starting from 15W, slowly increasing in each sitting by 2W in the fractional mode. The treatment was given for six sittings at a gap of four weeks. The side effects were noted.

For microdermabrasion, the configuration of the system used in this procedure is Dermapeel Gold manufactured by Derma India with a special imported pump and vacuum control knob.

After putting the patient in a comfortable position, the area to be treated was cleansed and degreased with acetone. Treatment parameters were set with pressure~400mm Hg. The handpiece was steadily moved over the target area, applying even pressure and leaving a uniform film of crystals to remove the stratum corneum without affecting the lower skin layers. The session consisted of one to three passes for a period of 15-30 minutes. The dust was wiped off from the surface and cleaned thoroughly with water. After 10 minutes, a moisturizer cream was applied. Sittings were repeated at two weeks interval for six months. Digital photographs were taken before each treatment session and were maintained in the database. By clinical assessment and based on the photographs, improvements were graded.

Acne scars were graded by Goodman and Baron score both pretreatment and post treatment. (Figure: 1)^{[9][10]}

[Figure: 1]

Grade	Level of disease	Clinical features	Example of scar
1	Macular disease	Erythematous, hyper- or hypo-pigmented flat marks visible to patient or observer irrespective of distance.	Erythematous, hyper-or hypo-pigmented flat marks.
2	Mild disease	Mild atrophy or hypertrophy that may not be obvious at social distance of 50cm or greater and may be covered adequately by makeup or the normal shadow of shaved beard hair in males or normal body hair if extra facial.	Mild rolling, small soft papular

Figure no 1 continued...

3	Moderate disease	Moderate atrophic or hypertrophic scarring that is obvious at social distances of 50cm or greater and is not covered easily by makeup or normal shadow of shaved beard hair in male or body hair if extra facial, but is still able to be flattened by manual stretching of the skin.	More significant rolling, shallow "box scar", mild to moderate hypertrophic or papular scar.
4	Severe disease	Severe atrophic or hypertrophic scarring that is obvious at social distances of 50cm or greater and is not covered easily by makeup or the normal shadow of shaved beard hair in males or body hair and is not able to be flattened by manual stretching of the skin.	Punched out atrophic, "ice pick", bridges and tunnels, gross atrophy, dystrophic scars, significant hypertrophy or keloid.

Statistical method

All the characteristics were summarized descriptively. For continuous variables, the summary statistics of mean± standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and diagrammatic presentation. Unpaired t-test was used to find association between two groups. If the p-value was <0.05, then the results were considered to be statistically significant.

RESULTS AND OBSERVATION

A total of 100 patients were selected and randomized into two groups. In both groups, age and gender were matched with no statistical difference in number, location and duration of scars between them. The duration of acne scars was 1-3 years in most of the patients. (Table: 1). The commonest location of the scars in both the groups was cheeks and forehead.

For treatment evaluation of fractional Co₂ laser, pre-treatment mean of acne scars grade was 3.12±0.71 reduced to 1.78±0.71 after 6months of treatment (table:2). On application of paired t-test, p-value was <0.05 that is statistically significant.

For microdermabrasion, pre-treatment mean of acne scars grade was 3.26±0.60 reduced to 2.62 ± 0.80 after 6months of treatment (table:3) On application of paired t-test, p-value was <0.05 that is statistically significant.

On comparison of fractional Co₂ laser with microdermabrasion, mean of post treatment acne scars grade of fractional Co₂

laser was 1.78 ±0.70, whereas mean of microdermabrasion was 2.62 ± 0.80. On application of unpaired t-test, p-value was <0.05 that means statistically significant (table: 4)

Pain and erythema were the commonest side effect seen in patients treated with fractional Co₂ laser.

Additional benefits like reduced seborrhoea and texture improvement were seen in both groups. (graph 1 and 2)

[Table: 1]

	Patients treated with fractional Co ₂ laser	Patients treated with microdermabrasion
Distribution according to age (in years)		
15-19	7	9
20-24	15	13
25-29	12	16
30-34	10	11
>34	6	1
Distribution according to sex		
Male	27	28
Female	23	24
Distribution according to duration of acne scars (in years)		
1-3	31	34
4-7	13	15
>7	6	1
Distribution according to type of scars		
Box scars	25	29
Ice pick scars	13	9
Rolling scars	12	12

[Table: 2]

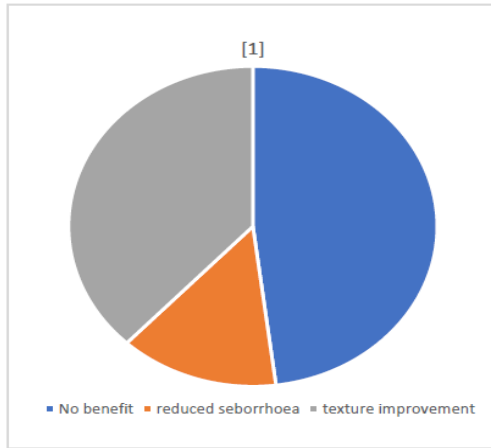
Fractional CO ₂ laser	Mean	SD	P VALUE
Pre-treatment grade	3.12	0.718	0.0001
Grade at 6 months	1.78	0.71	

[Table: 3]

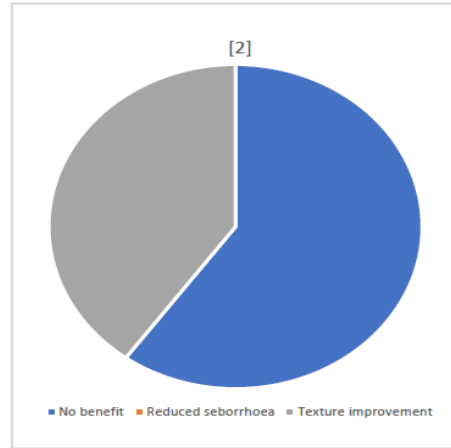
Microdermabrasion	Mean	SD	P VALUE
Pre-treatment grade	3.26	0.664	0.0001
Grade at 6 months	2.62	0.805	

[Table: 4]

	Mean	SD	P VALUE
Post-treatment grade in fractional CO ₂ laser	1.78	0.708	0.0001
Post-treatment grade in microdermabrasion	2.62	0.805	



[Graph 1: fractional Co2 laser]



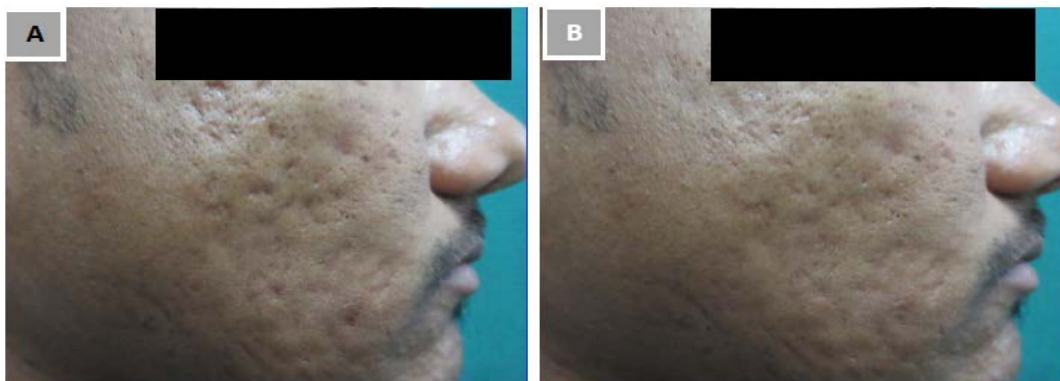
[Graph 2: microdermabrasion]

CONCLUSION

From above study, we concluded that though both the therapy was effective in treatment of acne scars, fractional Co2 laser was more effective than microdermabrasion

but the incidence of side effects was also higher in fractional Co2 laser.

The choice of treatment depends on both the morphological types as well as severity of each scar.



[Figure:2 Treatment with fractional Co2 laser, A: pretreatment, B post-treatment (after 6months)]



[Figure:3 Treatment with microdermabrasion, A: pretreatment, B: post-treatment (after 6months)]

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