

*Research Article*

## Fractional CO<sub>2</sub> Laser and Chemical Peeling for Treatment of Acne and Acne Scars: A Comparative Study

Hassan M. El-Fakahany, M.D ; Walid M. Mohamed, M.D  
and Sheyam S. Amer, M.B.B.Ch.

Department of Dermatology and Venerology, Minia University, Egypt.

### Abstract

**Background:** Acne is a common disorder with a more prevalence among adolescents and often it causes atrophic scars. Several treatment options are available for acne and atrophic acne scars treatment. The objective of the study was to compare the efficiency of fractional CO<sub>2</sub> laser and chemical peeling versus chemical peeling alone in treatment of acne and acne scars.

**Methods:** Thirty-two patients with acne and acne scars were enrolled in the study. procedure was done to all patients and repeated at every two weeks intervals for atotal of 4 sessions. Patients were followed up 4 weeks after the last session. The response to treatment was assessed by objective and subjective methods. **Results:** All patients completed the study and follow up period. There was statistically significant improvement in the scar depth in the left sides of faces of both acne scars subgroups. The first acne subgroup showed statistically significant improvement in the left sides, while the improvement in the left sides of the second subgroup was statistically in-significant.

**Conclusion:** Both fractional CO<sub>2</sub> laser and SA high concentration gave equally effective results in treatment of acne vulgaris .. Yet, fractional CO<sub>2</sub> laser is superior to mandelic acid chemical peeling in treatment of post acne scars even in high concentration.

**Keywords:** Fractional CO<sub>2</sub> leser, Chemical peeling, Acne, Post acne scars.

### Introduction

Acne vulgaris is an extremely common condition affecting the pilosebaceous unit of the skin, affecting mostly the face but also the back and chest<sup>(1)</sup>

Acne pathogenesis is a multifactorial process. Acne develops as a result of an interplay of the following four factors: (1) follicular epidermal hyperproliferation, (2) excess sebum production, (3) the presence and activity of the commensal bacteria propionibacterium acnes, and (4) inflammation.<sup>(2)</sup>

Scarring can occur as a result of damage to the skin during the healing of active acne. Scars originate in the site of tissue injury and may be atrophic or hypertrophic<sup>(3)</sup>.

Management of acne include (1) Diet, (2) Medications, (3) Procedures like comedo extraction, light therapy, dermabrasion, laser resurfacing and chemical peels<sup>(4)</sup>

Ablative” CO<sub>2</sub> fractional resurfacing device (AFP), produces an array of microthermal zones(MTZs) of a customizable density and depth, with a confluent pattern of ablation and

coagulation extending from the stratum corneum through the dermis. Within each MTZ, old epidermal pigmented cells are expelled and penetration of collagen in the dermis causes a reaction that leads to collagen remodeling and new collagen formation.<sup>(5)</sup>

Chemical peels are used to create an injury of specific skin depth with the goal of stimulating new skin growth and improving surface texture and appearance.<sup>(3)</sup>

The aim of the study was to determine efficiency of combined fractional CO<sub>2</sub> laser and chemical peeling versus chemical peeling alone in treatment of active acne and post- acne scars through a split face study.

### Methods

This study was carried out in the Department of Dermatology and venerology ,Minia university, Egypt from June 2016 to June 2018. A total of 32 patients with acne and acne scars were enrolled for the study. the inclusion criteria was emotionally balanced patients with realistic expectation with facial acne and acne scars. The exclusion criteria were patients with history of

isotretinoin use in the past six months, herpes simplex infection, keloids, intake of any acne inducing drugs and systemic illness such as hypertension, diabetes and thyroid problems. Also, pregnant and lactating women were excluded. All patients were evaluated by detailed history, general and dermatological examination. Patients were explained about the outcome, side effects and complications of the procedure. An informed written consent and photographs were taken prior to the procedure. Approval was obtained for the study from the local ethical committee. The patients were divided into 2 groups according to the disease;

- The first group (acne patients group): included 16 patients with active acne vulgaris who were further subdivided equally into 2 subgroups treated with

fractional laser and SA 10% on left side of the face, while the right side treated with SA 10% or 20% only.

- The second group (post acne scar group): included 16 patients with atrophic post acne scars who were further subdivided equally into 2 subgroups treated with fractional laser and MA 30% on the left side, while the right side treated with MA 30% or 50% only. Each patient received 4 sessions with 2 weeks interval between sessions, and assessed 4wks after the last session.
- Clinical response was assessed by two independent dermatologists. The patients satisfactions were assessed by pre-formed questionnaire given to them at the end of the study.<sup>(6)</sup>

**Results**

**Table (1): comparison between SFL and SPR in first post acne scar subgroup:**

		SFL N=8		SPR N=8		P value
		N	%	N	%	
Scar depth	No improvement	0	0%	4	50%	0.005*
	Mild improvement	2	25%	4	50%	
	Marked improvement	6	75%	0	0%	
erythema	Mild erythema	2	25%	0	0%	0.1
	No erythema	6	75%	8	100%	
Hyperpigmentation	No hyperpigmentation	8	100%	8	100%	0.5
New acne lesions	Mild	1	12.5%	4	50%	0.1
	No	7	87.55	4	50%	
Skin texture	No improvement	0	0%	2	25%	0.007*
	Mild improvement	2	25%	6	75%	
	Marked improvement	6	75%	0	0%	
Skin complexion	No improvement	0	0%	2	25%	0.04*
	Mild improvement	4	50%	6	75%	
	Marked improvement	4	50%	0	0%	

N.B :- SFL (scar fractional left) , SPR (scar peeling right).

First acne subgroup showed a statistically significant improvement on left side than on right side concerning acne lesions and skin texture and statistically insignificant improvement in skin complexion. While both sides

showed mild new acne lesions, there was marked erythema on right side compared to mild erythema on left side and mild hyperpigmentation on left side.

Second acne subgroup showed a statistically significant improvement on left side than on right side concerning skin complexion and skin texture and statistically insignificant improvement in acne lesions. While right side showed mild new acne lesions, there was mild erythema and mild hyperpigmentation on left side.

First acne scar subgroup showed a statistically significant improvement on left side than on right side concerning depth of scars, skin texture and skin complexion. While both sides showed mild new acne lesions, there was mild erythema and mild hyperpigmentation on left side.

showed no post-procedure hyperpigmentation, there was mild erythema on left side and mild new acne lesions on both sides.

Second acne scar subgroup showed a statistically significant improvement on left side than on right side concerning depth of scars and skin texture and statistically insignificant improvement in skin complexion. While both sides showed mild new acne lesions, there was mild erythema and mild hyperpigmentation on left side.



Fig. 1: second post acne scar subgroup case



Fig. 2: second acne subgroup case

**Discussion**

Our study showed that MA has a mild effect even in the high concentration ; this proves that the efficacy of fractional CO<sub>2</sub> laser in treatment of acne scars is superior to that of chemical peeling even in high concentration. there were no studies using combination of fractional CO<sub>2</sub> laser and MA or even MA alone in treatment of post acne scars, so the present study is the only

one evaluating this. However Ahmed et al., (28 patients) found the efficacy of CO<sub>2</sub> laser pinpoint irradiation to be superior to that of chemical peeling (trichloroacetic acid chemical reconstruction of skin scars – TCA CROSS technique).<sup>(7)</sup> Our study also proved the efficacy of fractional CO<sub>2</sub> in treatment of active acne, this agree with a study done by Shin et al., in 2012 on 20 patients with acne.<sup>(8)</sup> and also with a

study done by Cho et al., to demonstrate the effect of fractional CO<sub>2</sub> laser on the course of inflammatory reactions in suppurative diseases of the skin<sup>(9)</sup>. This study also proved the efficacy of salicylic acid in high concentration in treatment of acne vulgaris, this agrees with many studies as that done by Hashimoto et al., and Dainichi et al.,<sup>(10,11)</sup>

### Conclusion

Both fractional CO<sub>2</sub> laser and SA high concentration gave equally effective results in treatment of acne vulgaris. However, Skin texture improved more with fractional. Yet, fractional CO<sub>2</sub> laser is superior to mandelic acid chemical peeling in treatment of post acne scars even in high concentration.

### References

1. Dawson AL, Dellavalle RP(2013):Acne vulgaris. *BMJ*; 346:f2634.
2. Thiboutot D, Gollnick H, Bettoli V, Dreno B, Kang S, Leyden JJ (2009): New insights into the management of acne:an update from the global alliance to improve outcomes in acne group. *J Am Acad Dermatol*;60:S1-50.
3. Levy LL & Zeichner JA (2012): Management of acne scarring, part II: a comparative review of non-laser-based, minimally invasive approaches. *American Journal of Clinical Dermatology*; 13:331-40.
4. Chapas AM, Brightman L, Sukal S, Hale E, Daniel D, Bernstein LJ, Geronemus RG (2008): Successful treatment of acneiform scarring with CO<sub>2</sub> ablative fractional resurfacing. *Laser in surgery and medicine*; 40: 381-6.
5. Carniol PJ, Hamilton MM, Carniol ET (2015): Current status of fractional laser resurfacing; *JAMA Facial Plast Surg*, 10: 1001-693.
6. Anupama YG, Wahab AJ (2016). Micro-dermabrasion for treatment of acne scars in south indian patients: a clinical study. *Int J Res Dermatol* 2(4):109-112.
7. Ahmed R, Mohammed G, Ismail N (2014). Randomized clinical trial of CO<sub>2</sub> LASER pinpoint irradiation technique versus chemical reconstruction of skin scars (CROSS) in treating ice pick acne scars. *J Cosmet Laser Ther*; 16(1): 8–13.
8. Shin JU, Lee SH, Jung JY, Lee JH (2012). A split-face comparison of a fractional microneedle radiofrequency device and fractional carbon dioxide laser therapy in acne patients (5):212-7.
9. Cho SB, Lee SJ, Kang JM, Kim YK, Chung WS, Oh SH (2009). The efficacy and safety of 10,600-nm carbon dioxide fractional laser for acne scars in Asian patients. *Dermatol Surg* 35:1955–61.
10. Hashimoto Y, Suga Y, Mizuno Y, Hasegawa T, Matsuba S, Ikeda S, et al., (2008). Salicylic acid peels in polyethylene glycol vehicle for the treatment of comedogenic acne in Japanese patients. *Dermatol Surg* 34:276–279.
11. Dainichi T, Ueda S, Imayama S, Furue M (2008). Excellent clinical results with a new preparation for chemical peeling in acne: 30% salicylic acid in polyethylene glycol vehicle. *Dermatol Surg*; 34:891-899