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Original Article

Outcome of microneedling combined with 35% focal trichloroacetic acid peeling in post acne atrophic scars

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Abstract

Objective To study the outcome of microneedling combined with 35% focal trichloroacetic acid peeling in post acne atrophic scars.

Methods This study was conducted in department of dermatology, unit 1, Jinnah hospital, Lahore. A total of 90 patients with Goodman Baron grade 2, 3 & 4 post acne atrophic scars were included in the study. All patients were treated with microneedling alternating with trichloroacetic acid focal peel via CROSS technique at 2 weekly intervals.

Results Combination therapy with microneedling followed by trichloroacetic acid peeling resulted in improvement of 1 grade in 93.3% patients with grade 3 and 4 post acne atrophic scars regardless of the age, gender, duration and type of scar and the baseline grade of scarring. There was statistically no significant difference in the frequencies of improvement across various subgroups of patients based on patient's age (p-value=0.731), gender (p-value=0.461), duration of disease (p-value=0.777), type of scar (p-value=0.899) and baseline Goodman and Baron Grade (p-value=0.821).

Conclusion Combination therapy of microneedling followed by trichloroacetic acid peeling resulted in improvement of 1 grade in 93.3% patients with grade 3 and 4 post acne atrophic scars.

Key words
Icepick and Boxcar scars, microneedling, trichloroacetic acid, outcome.

Introduction

Acne vulgaris is an inflammatory disorder of pilosebaceous units characterized by over-activity and plugging of sebaceous glands and ducts respectively. It clinically manifests as papules, pustules and nodules over face and trunk. Acne affects 9.4% of the global population, making it the eighth most prevalent disease worldwide.[1] Prevalence of acne among adolescents is 85% and it is more common among females than males, although, severe forms occur commonly in males.[2,3] Women experience acne at higher rates than their male counterparts across all age groups 20 years and older.

Inflammation in acne can lead to variety of scars. Mostly acne leads to atrophic scars which are depressed because of underlying fibrotic adhesions and loss of tissue i.e. boxcar scars and ice pick scars. Occasionally, hypertrophic elevated scars due to excess tissue deposition occur.[3] Acne scars usually correlate with the severity and duration of acne and delay in treatment. Minor scarring may occur in up to

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95% of patients while severe acne scarring occur in only up to 22% patients.[3]

Treatment of acne scars is challenging and modalities for atrophic acne scars include chemical peels, microdermabrasion, dermabrasion, microneedling and laser resurfacing.

Trichloroacetic acid (TCA) is an analogue of acetic acid that is safe and effective for superficial and medium depth peels. It results in keratinocyte coagulation and increased dermal collagen and elastin deposition. Chemical reconstruction of skin scars (CROSS) includes focal application of TCA (35 to 100%) with appropriate pressure via a sharp wooden tip applicator specifically to the atrophic scars resulting in precise effects, rapid healing and few complications.[4,5] In a study on post acne boxcar scars using 70% TCA peel, excellent improvement (>50%) was seen in 66 % of patients.[6] Two studies using TCA on ice pick scars in Asian skin type, showed excellent improvement in 78 to 81% patients from grade 4 to grade 2 as per Goodman Baron system, after four therapeutic sessions.[7,8]

Microneedling is a minimally-invasive therapy that involves the use of a dermapen device with disposable needles of various lengths to create micro-channels in the stratum corneum which cause percutaneous neocollagenization via release of growth factors and fibroblast stimulation. Collagen type III induced in this procedure is replaced by collagen type I gradually over a period of an year.[13]

As atrophic acne scars are usually resistant to various treatment modalities used alone, there is an increased trend toward combination therapies for optimized results.[3,9,16] A study in India in 2014 using microneedling alternatively with 15% trichloroacetic acid focal peel on post acne icepick scar patients with FitzPatrick skin type 3, 4 and 5 revealed 100% improvement in scars in all enrolled patients by 1-2 Goodman Baron grades.[9]

The present study was planned to determine the outcome of this combined approach i.e. microneedling with trichloroacetic acid focal peel in our population as existing evidence was limited & no such local published data was available.

This combination therapy can be a good addition to the armamentarium available for treatment of post acne atrophic scars.

Methodology

The study was carried out in outpatient department of dermatology unit 1, Jinnah Hospital, Lahore from August 2017 to February 2018. A total of 90 patients between 16-50 years of age and Fitzpatrick skin type 4 having moderate (Grade 3) & severe (grade 4) Goodman Baron acne scars were included in study (**Table 1**). Patients were selected by non-probability, consecutive sampling.

Patients who were pregnant & lactating, had keloidal tendency or history of hypersensitivity to TCA were excluded from the study. Similarly patients suffering from herpes simplex , hepatitis B, hepatitis C, HIV and connective tissue disease and those who were on oral anticoagulants, steroids or retinoids were also excluded.

After written informed consent patient's details were recorded on predesigned proformas. For each patient there were five sittings of microneedling and five sessions of TCA peels and the interval between microneedling and TCA peeling was two weeks. Under aseptic measures, four passes of microneedling (in

Table 1 Grading of the atrophic scars as per Goodman and Baron Qualitative Acne Scar Grading Scale

Grade	*Features*
1	Macular erythematous hypopigmented or hyperpigmented flat marks visible to the observer irrespective of distance.
2	Mild atrophy not obvious at social distances of 50 cm or greater, easily covered by facial make up or beard hair.
3	Moderate atrophy obvious at social distance of greater than 50 cm; not easily covered by make up or beard hair; but able to be flattened by manual stretching (Shallow boxcar scars)
4	Severe atrophy atrophy obvious at social distance of greater than 50cm; not easily covered by make up or beard hair; not flattened by manual stretching of skin (Icepick scars and Deep boxcar scars)

Table 2 Baseline characteristics of study sample

Characteristics	*Participants (n=90)*
Age (years)	
16-29 years	79 (87.8%)
30-42 years	11 (12.2%)
Gender	
Male	27 (30.0%)
Female	63 (70.0%)
Duration of Acne Scars (years)	
1-3 years	50 (55.6%)
4-6 years	40 (44.4%)
Acne Scar Type	
Boxcar Scar	46 (51.1%)
Icepick Scar	34 (37.8%)
Mix Scar Patients	10 (11.1)

Table 3 Gender versus predominant morphology of acne scar

Morphology of acne scar	*Gender (n=90)*	
	Male (n=27)	*Female (n=63)*
Boxcar scar	5	41
Icepick scar	20	14
Mixed scar	2	8

horizontal, vertical and diagonal directions) were carried out using 1.5mm depth of dermapen on atrophic acne scars on face. Two weeks following the microneedling session, patients had 35% Trichloroacetic acid focal peeling done on these atrophic scars with the help of sharp disposable wooden-tip applicators. The appearance of speckled white frosting was the end point of focal TCA peel. Sunscreen was advised and continued till the end of the study period. Goodman Baron grade assessment and digital photographs were taken at baseline and at 15 days after the final treatment session.

Outcome i.e. improvement in Goodman and Baron Acne Scar grade before starting treatment and 15 days after last treatment session was documented.

Results

Total number of our study participants was 90. The ages of these patients ranged from 16 years to 42 years with a mean of 23.3±5.5 years. There were 27 (30.0%) male and 63 (70.0%) female patients with a male to female ratio of 1: 2.3. The duration of acne scars ranged from 1 year to 6 years with a mean of 3.3±1.5 years. Majority of the patients had boxcar scars (51.1%) followed by ice pick scars (37.8%) while only a small number (11.1%) had mixed scars as shown in (**Table 2)**.

Female patients suffered more from boxcar scars as compared to male patients in whom predominant scar type was ice pick scars (**Table 3)**.

At presentation patients had predominantly, moderate and severe acne scars, i.e. 49 (54.4%) patients had moderate (Grade-3) scars and 41 (45.6%) patients had severe (Grade-4) scars. On follow-up i.e. 15 days after final treatment session, 46 (51.1%) patients had mild (Grade-2 scars), 41 (45.6%) patients fulfilled moderate i.e. Grade 3 acne scar criteria and only 3 (3.3%) patients were left with severe i.e. Grade 4 acne scaring as shown in **Table 4(A)**. There was improvement of at least 1 grade in 84 (93.3%) patients from baseline **Table 4(B)**.

Table 4A Acne scar severity before and after treatment.

Acne scar severity	*Pre-treatment*	*Post-treatment*
Mild (grade 2)	0(0.00%)	46(51.1%)
Moderate (grade 3)	49(54.4%)	41(45.6%)
Severe (grade 4)	41(45.6%)	3(3.3%)

Grade: In accordance with Goodman and Baron Qualitative Acne Scar Scale

Table 4B Frequency of improvement of at least 1 grade 15 days after final session.

Improvement	*Number of patients (n)*	*Frequency (%)*
Yes	84	93.3
No	6	6.7
Total	90	100.0

Table 5 Frequency of Improvement across various Subgroups.

Characteristics	*Number of Patients(n)*	*Improvement (% of patients)*	*P-value*
Age (years)			
18-29 years	79	74 (93.7%)	
30-42 years	11	10 (90.9%)	0.731
Gender			
Male	27	26 (96.3%)	0.461
Female	63	58 (92.1%)	
Duration of Acne Scars			
1-3 years	50	47 (94.0%)	0.777
4-6 years	40	37 (92.5%)	
Acne Scar Type			
Icepick Scar	34	32 (94.1%)	0.899
Box Scar	46	43 (93.5%)	
Mixed Scar	10	9 (90.0%)	
Baseline Goodman & Baron Grade			
Grade-III	49	46 (93.9%)	0.821
Grade-IV	41	38 (92.7%)	

Chi-square test, observed difference was statistically insignificant

Data was stratified for age, gender, duration and type of acne scar and baseline scar grade of the patients to address effect modifiers and post-stratification chi-square test was applied taking p value ≤0.05 as statistically significant. There was no statistically significant difference in the frequency of improvement across various subgroups based on patient's age (p-value=0.731), gender (p-value=0.461), duration of disease (p-value=0.777), type of scar (p-value=0.899) and baseline Goodman and Baron Grade (p-value=0.821) as shown in **Table 5**.

Discussion

Atrophic acne scars are usually resistant to treatment modalities used alone, so there is an increased trend towards combination therapies for optimized results.[3,9,16] The present study was planned to determine the outcome of combining microneedling with trichloroacetic acid focal peel in patients with post acne atrophic scars in our population.

The mean age of our patients was 23.3±5.5 years and the mean duration of acne scars was 3.3±1.5 years. This was comparable to other studies by Rajar *et al*., Rana *et al.* and Saadawi *et al.*[17-19] Majority of the patients in our study were females. A similar female predominance was reported from India, Thailand and Korea.[18, 20-22]

In our study, 46 (51.1%) patients had boxcar scars whereas 34 (37.8%) patients had ice pick scars and only 10 (11.1%) patients had mixed scarring. Saadawi *et al.* reported a comparable frequency of box scars (52.4%) and ice pick scars (47.6%) from Egypt.[19]

Figure 1 Before and after treatment with microneedling combined with focal trichloroacetic acid peeling.

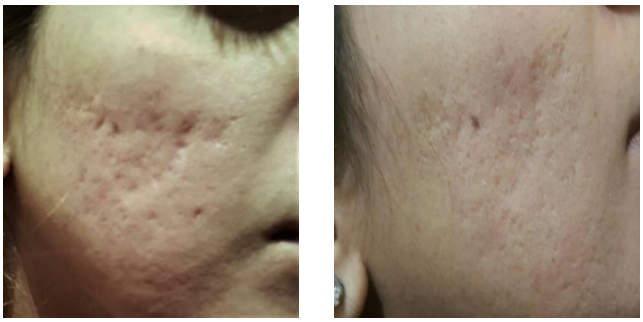

Figure 2 Before and after treatment with microneedling combined with focal trichloroacetic acid peeling.

Figure 3 Before and after treatment with microneedling combined with focal trichloroacetic acid peeling.

Figure 4 Before and after treatment with microneedling combined with focal trichloroacetic acid peeling.

Female patients had an increased frequency of boxcar scars whereas in males the predominant scar type was ice pick scars. This difference may correlate with the difference in skin morphology among the two genders like larger pore size and higher sebum production in male patients as compared to females.[10,11]

In the present study, improvement of at least 1 grade was observed in 84 (93.3%) patients from baseline after 15 days of final session. At baseline, 54.4% patients had Grade-3 scars while 45.6% had Grade-4 scars. On follow-up i.e. 15 days after final treatment session, 51.1% had Grade-2 i.e. mild scars, 45.6% patients fulfilled moderate, i.e. Grade-3 acne scar criteria and only 3.3% patients were left with severe i.e. Grade-4 acne scaring. Our results are comparable to other International studies.[23,24] All our patients tolerated the procedure well with only mild and transient stinging and burning.

Limitations of our study were lack of a control group and majority of patients could not be followed annually for post final treatment session at which we could have observed further results of ongoing collagen induction & remodeling.

The present study is first of its kind in local population and adds to the existing research evidence on the topic. Combination therapy of

microneedling with 35% trichloroacetic acid focal peeling resulted in clinical improvement in a substantial proportion of patients of post-acne atrophic scars. Its judicious use is therefore a good addition to the available therapies for a condition that is challenging to treat.

Conclusion

Combination therapy with microneedling followed by trichloroacetic acid peeling resulted in improvement of 1 grade in 93.3% patients with grade 3 and 4 post acne atrophic scars regardless of patient's age, gender, duration of disease, type of scar and baseline Goodman and Baron Grade.

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