

Original Article

A comparison of treatment efficacy of chemical reconstruction of skin scars using 50% trichloroacetic acid peel with microneedling in acne scars

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Abstract

Objective To assess the effectiveness of chemical reconstruction of skin scars (CROSS) using 50% TCA peel and Microneedling in acne scars.

Methods This trial was carried out from 15th March to 14th September 2022, at Outpatient Department of Dermatology, Services Hospital, Lahore. Patients of both genders and 18 to 50 years of age, who had grade 2 to 4 acne scars were enrolled. Their acne scars were graded by Goodman's Qualitative Acne Scarring Grading System. Paper lottery method was used to randomly divide them into 2 groups. Group A patients received 50% TCA peel whereas in Group B, patients were treated with microneedling with dermapen. Follow-up was done one month after the last treatment session and the response was recorded. Excellent response was labelled if patient's acne scars reduced by two grades, good response if one grade was reduced and a poor response was no improvement. Efficacy was considered as good or excellent response.

Results A total of 84 patients were enrolled. The mean of the ages of patients in group A was 33.21 ± 7.22 years and in group B was 32.12 ± 6.59 years. Majority of the patients 60 (71.43%) were between 18 to 35 years of age. Out of 84 patients, 73 (86.90%) were females and 11 (13.10%) were males with female to male ratio of 6.6:1. Efficacy of Group A (50% TCA peel) was noted in 31 (73.81%) patients while in Group B (microneedling with dermapen) it was seen in 39 (92.86%) patients (p-value = 0.019).

Conclusion We concluded that microneedling with dermapen was more efficacious in the treatment of post acne facial scars than chemical reconstruction of scars (CROSS) with 50% TCA peel.

Key words

Acne scars; 50% trichloroacetic acid peel; Microneedling; Efficacy.

Introduction

Acne vulgaris affects 9.4% of the world's population and prevalence in Pakistan is 5%.¹ Although acne vulgaris affects the seborrheic sites which are the face, upper arms, chest, and the back: facial acne is most troublesome for the

patients. The post acne scarring is common sequel of acne vulgaris and its severity correlates with the acne scar subtypes and grades.² Post acne scarring affects some prone patients, the underpinned pathophysiology has several healing related desegulations. Post acne scars can manifest as atrophic scars due to net loss of collagen in the facial dermal layer or as hypertrophic scars.³ The scar may fade slowly with time but this causes significant issues in social interaction and may lead to lower self-

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esteem, anxiety and decreased academic performance. It may also lead to depression to the extent of suicide.⁴

The treatments for post acne scars include resurfacing procedures, lifting procedures, excisional techniques and others.² Resurfacing procedures like chemical peels are extensively used in the treatment of acne scars. Chemical peel leads to shedding of superficial layer of skin and scars, followed by regrowth of epidermis and dermis. The chemical peel is selected on the basis of patient's skin type and acne scars subtype. To produce best results, multiple sessions of chemical peels should be used.⁵ One of the frequently applied medium depth chemical peels is 50% trichloroacetic acid (TCA). It easily penetrates the dermis making it perfect to use. These peels lead to necrosis of superficial dermis and epidermis causing homogenization and oedema along with lymphocytic inflammation.⁵

Microneedling is one of the recent advances in the treatment of acne scars. Microneedling has the ability to trigger new collagen synthesis in the dermis. It is a minimally invasive procedure involving superficial and controlled puncturing of the skin by rolling with miniature fine needles.⁶

In one study, microneedling combined with 35% TCA focal peeling produced improvement in acne scars. This efficacy was not affected by age or gender of the patient, disease duration or the type or grade of scar.⁷ In another study, 50% TCA peeling at four weeks interval was found to be effective in 63.3% of patients while microneedling, at four weeks interval, was effective in 86.7% of patients.⁸

Post acne scarring is very common among adolescents; it is associated with many complications which are very troublesome for patients and their families. Treatment of post

acne facial scarring has been a challenge, despite a wide array of options available, there is no 'gold standard'. The quest for newer remedies and betterment of existing options still exists. Novel treatments like derma pen are being advocated. Lack of sufficient local data further enhances the need for this study. It will also prove beneficial to our patients and improve the quality of their life.

Methods

After obtaining approval from the Ethical Review Committee, 84 patients were enrolled from OPD using non-probability consecutive sampling. The patients were assessed for post acne facial scars. Detailed history was taken. The patients underwent general and dermatological examination. Informed consent was taken from patients who fulfilled the inclusion criteria [age 18 to 50 years, either gender, Fitzpatrick skin type III-IV, having grade 2 to 4 acne scars (according to Goodman's Qualitative Acne Scarring Grading System)].⁹ Exclusion criteria included hypersensitivity to TCA, bleeding disorders, disorders of platelet number or function, patients taking anticoagulants, active infection or inflammation at the site of treatment or a tendency to develop keloids. Patients with history of photosensitivity and systemic diseases like diabetes and pregnant or lactating mothers were excluded from the study. Patients with history of chemical peeling, microdermabrasion or laser treatment within last 6 months were also excluded.

Enrolled patients underwent randomization using paper lottery method into two equal groups. Group A included 42 patients, who were treated with 50% TCA peel. Group B included 42 patients who were treated with microneedling with dermapen. Each patient received six therapy sessions with 2-week intervals between the sessions. Patients were called for follow-up one month after the last treatment session.

Pictures were taken before and after treatment. Any untoward effects seen in any patient like pain, edema, hyperpigmentation or erythema were managed.

Group A patients were treated with 50% TCA peel using CROSS technique. After thoroughly washing their faces with soap, the patients removed any oil or leftover make up. Ethyl alcohol swab was used to clean the patient's skin. TCA was applied using a cotton bud, on the whole face starting from forehead, since the skin of forehead is relatively less sensitive and can stand the exposure to acid better than the rest of the face. More sensitive regions, like lips and nasolabial folds were protected with vaseline. The applicator was held tightly in contact with the skin for 30 second and a uniform frosting at the site was the endpoint. Neutralization was done with tap water. If desired frosting was not achieved, the process was repeated after 2 minutes. If frosting was observed or patient complains of burning, irritation or pain at any site before the end point or expected time, it was neutralized immediately by saline and then washed with water. After each session sun screen was advised.

The patients in Group B underwent microneedling with dermapen. Ultima AI -C dermapen (needle No.36) was used. Topical 10% lidocaine cream was applied as local anesthetic for an hour to the face before microneedling. After removing the cream, Dermapen was passed in various directions with minimal pressure (vertical, up, down, horizontal, to the right, to the left and in both oblique planes). The appearance of pinpoint bleeding spots on the treatment area was taken as the endpoint for the session. In both the groups, patients were prescribed topical antibiotics, sunblock and moisturizer to be applied every day. Goodman's Qualitative grades were evaluated before and one month after the

procedure. Excellent response was labelled if patient's acne scars reduced by two grades, good response if one grade was reduced and a poor response was no improvement. Efficacy was considered as good or excellent response. Demographic details of patients were recorded on a pre-designed proforma.

Data analysis was carried out using SPSS v23. Quantitative variables such as ages of the patients and duration of acne scars were presented as mean and S.D. Qualitative variables such as gender, Fitzpatrick skin type, type of acne scars, severity of disease and efficacy were presented as frequencies and percentages. Chi-square test was applied to compare efficacy between the groups (Group A and B). Effect modifiers such as age, gender, duration of scars, Fitzpatrick skin type, types of acne scars and severity of disease were controlled through stratification. Post-stratification chi-square test was applied and p-value ≤ 0.05 was taken as significant.

Results

Age range of patients in this study was from 18-50 years with mean age of 32.87 ± 7.02 years. The mean age of patients in group A was 32.12 ± 6.59 years and in group B was 33.21 ± 7.22 years. Majority of the patients 60 (71.43%) were between 18 to 35 years of age as shown in **Table 1**. Out of 84 patients, 73 (86.90%) were females and 11 (13.10%) were males, with a female to male ratio of 6.6:1. Mean duration of disease was 7.13 ± 2.65 months. Frequencies of patients according to types of scars, Fitzpatrick skin type and severity of disease are shown in **Table 1**. Efficacy of Group A (50% TCA peel) was seen in 31 (73.81%) patients while in Group B (microneedling with dermapen) efficacy was seen in 39 (92.86%) patients as shown in **Figure 1** (p-value=0.019). Stratification of efficacy with respect to age,

Table 1 Distribution of patients according to Demographic characteristics.

		Group A (n=42)		Group B (n=42)		Total (n=84)	
		Frequency	%age	Frequency	%age	Frequency	%age
Age (years)	18-35	28	66.67	32	76.19	60	71.43
	36-50	14	33.3	10	23.81	24	28.57
Gender	Female	36	85.71	37	88.10	73	86.90
	Male	06	14.29	05	11.90	11	13.10
Duration of disease (months)	≤6 months	21	50.00	14	33.33	35	41.67
	>6 months	21	50.00	28	66.67	49	58.33
Type of Acne Scars	Icepick	18	42.86	20	47.62	38	45.24
	Boxcar	15	35.71	16	38.10	31	36.90
	Rolling	09	21.43	06	14.29	15	17.86
Fitzpatrick skin type	III	22	52.3	24	57.14	46	54.76
	IV	20	47.62	18	42.68	38	45.24
Severity of Scars	Grade 2	14	33.33	13	30.95	27	32.14
	Grade 3	23	54.76	25	59.52	48	57.14
	Grade 4	5	11.90	04	9.53	09	10.71

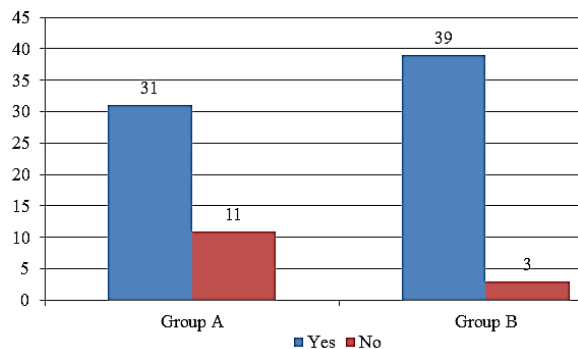


Figure 1 Comparison of efficacy in both groups.

gender, duration of scars, Fitzpatrick skin type, types of acne scar and severity of disease is shown in **Table 2**.

It is concluded from above statistics that efficacy in both the groups was significantly affected by younger age, female gender, shorter disease duration, milder disease and Fitzpatrick type III skin. **Figures 2a,2b** show improvement in acne scars after treatment with TCA peel, while **Figures 2c,2d** show improvement after microneedling.

Discussion

Since acne is a frequently encountered problem with psychologically disabling sequel of scarring,^{1,2} we needed to assess the two commonly used treatment modalities of TCA

peel and microneedling in our population. It was observed that in both groups a high percentage of patients achieved efficacy. In group A (50% TCA peel), 31 (73.81%) patients achieved efficacy end point, while in Group B (microneedling with dermapen) it was seen in 39 (92.86%) patients which was significantly higher (p-value=0.019). The mean age of our patients was 32.87 ± 7.02 years. Majority of the patients 60 (71.43%) were young, between 18 to 35 years of age and most were females with a female to male ratio of 6.6:1. Mean duration of disease was 7.13 ± 2.65 months. It was seen that statistically significant improvement is seen in younger age, female gender, shorter disease duration, milder disease and Fitzpatrick type III skin.

Several researchers have been working on analysing and improving management of acne scars worldwide.¹⁰ Ehsan *et al.*⁸ compared microneedling and 50% TCA peel in 60 patients of acne scars and they too found microneedling to be significantly more effective in reducing facial scars, although both treatments showed good results. They too observed better efficacy in younger patients and those with shorter disease duration. This is probably due to similar ethnic origin of patients and similar methodology used by the researchers.

Table 2 Stratification of efficacy with respect to Effect modifiers.

		Group A (n=42)		Group B (n=42)		P-value
		Efficacy		Efficacy		
		Yes	No	Yes	No	
Age (years)	18-35	20(71.43%)	08(28.57%)	30(93.75%)	02(6.25%)	0.021
	36-50	11(78.57%)	03(21.43%)	09(90.0%)	01(10.0%)	0.459
Gender	Male	05(83.33%)	01(16.67%)	05(100.0%)	00(0.0%)	0.338
	Female	26(72.22%)	10(27.78%)	34(91.89%)	03(8.11%)	0.028
Duration (months)	≤6	13(61.90%)	08(38.10%)	14(100.0%)	00(0.0%)	0.009
	>6	18(85.71%)	03(14.29%)	25(89.29%)	03(10.71%)	0.706
Fitzpatrick skin type	III	16(72.73%)	06(27.27%)	22(91.67%)	02(8.33%)	0.091
	IV	15(75.0%)	05(25.0%)	17(94.44%)	01(5.56%)	0.101
Type of acne scar	Icepick	14(77.78%)	04(22.22%)	19(95.0%)	01(5.0%)	0.117
	Boxcar	11(73.33%)	04(26.67%)	15(93.75%)	01(6.25%)	0.123
	Rolling	06(66.67%)	03(33.33%)	05(83.33%)	01(16.67%)	0.475
Severity of disease (Grade)	2	07(50.0%)	07(50.0%)	12(92.31%)	01(7.69%)	0.016
	3	20(86.96%)	03(13.04%)	24(96.0%)	01(4.0%)	0.257
	4	04(80.0%)	01(20.0%)	03(75.0%)	01(25.0%)	0.858

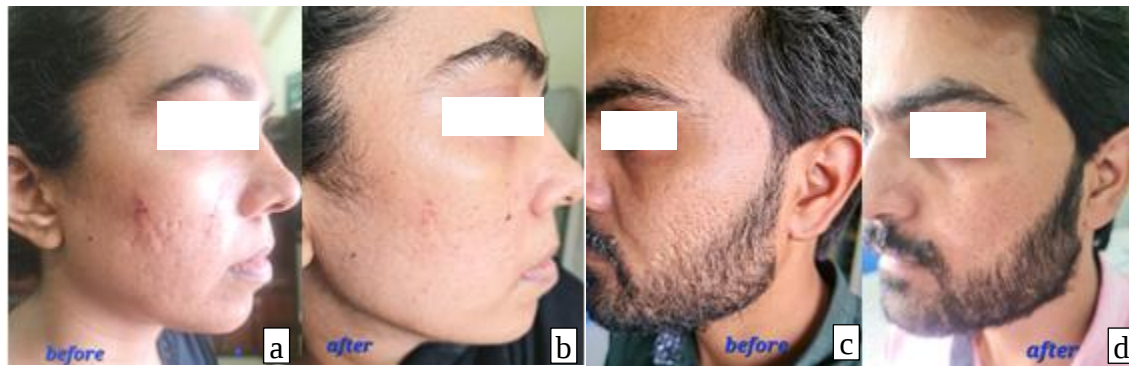


Figure 2 a&b Before and after TCA peel. c&d Microneedling.

Dhollan *et al.*¹¹ compared microneedling with 100% TCA peel for acne scars in Indian population. They too observed significant improvement in acne scars in both groups but the difference was comparable. This may be because they used a higher strength of the peel and increasing the strength of the peel might have increased its efficacy. However, a small sample size of 30 patients makes the results less reliable.

Several researchers have been working on TCA peel in acne scars over the years.¹⁰ Agarwal *et al.* analysed the role of 70% TCA peel using CROSS technique and found it to be effective in 66% patients.¹² Bhardwaj *et al.* applied 100% TCA fortnightly on Indian patients. They found efficacy in 80% patients.¹³ Al-Hamamy *et al.*

studied the efficacy of 25% TCA along with dermasanding. Satisfactory results were reported by them.¹⁴

Similarly, researchers across the globe have been working on role of microneedling using several devices in acne scars.¹⁰ Tirmizi *et al.*¹⁵ noted efficacy of monthly microneedling sessions in patients of acne scars along with overall improvement in skin texture. Biesman *et al.* compared the role of microneedling alone versus microneedling combined with Polymethylmethacrylate-Collagen Gel Dermal Filler (PMMA). This along with several other studies suggest beneficial role of combining microneedling with some adjunct rather than monotherapy.^{16,10} Schoenberg *et al.*, also reported better results of microneedling

combined with platelet rich plasma rather than microneedling alone.¹⁷

Most of these studies analysed the efficacy of a single agent. Since not much data was available on comparison of these two modalities, the current study was conducted this study.

Conclusion

It is concluded that both microneedling and TCA peeling are effective in improving acne scars. However, there was a significantly better response noted with microneedling. It is suggested that more work be done on this topic, and combining microneedling with other therapies may improve the efficacy further.

References

1. Babar O, Mobeen A. Prevalence and Psychological Impact of Acne Vulgaris in Female Undergraduate Medical Students of Rawalpindi and Islamabad. Pakistan. *Cureus*. 2019;**11**(9):e5722. DOI 10.7759/cureus.5722
2. Fife D. Evaluation of Acne Scars. How to Assess Them and What to Tell the Patient. *Dermatol Clin* [Internet]. 2016;**34**(2):207-13. Available from: <http://dx.doi.org/10.1016/j.det.2015.11.009>
3. Deirdre Connolly, Ha Linh VU. Kavita Mariwalla NS. Acne Scarring- pathogenesis, evaluation, and treatment options. *J Clin Aesthet Dermatol*. 2017;10(9):12-23.
4. Cachafeiro T, Escobar G, Maldonado G. Cestari T, Corleta O. Comparison of nonablative fractional erbium laser 1,340 nm and microneedling for the treatment of atrophic acne scars: A randomized clinical trial. *Dermatologic Sui*.2016;**42**(2):13-41.
5. Damasceno PS, Maria 1, Costa C, Gabrielle K. Gomes P. Chemical and Physical Peelings. *Chemical Physical Peelings*. 2016;**98**(2):121-4.
6. Ramaut L, Hoeksema H, Pirayesh A, Stillaert F. Monstrey S. Microneedling: Where do we stand now? A systematic review of the literature. *J Plast Reconstr Aesthetic Surg* [Internet].2018;**71**(1):1-14.
7. Anum S. Outcome of microneedling combined with 35% focal trichloroacetic acid peeling in post ache atrophic scars. *J Pak Assoc Dermatol*. 2020;**30**(2):242-8.
8. Ehsan I, Ahsan U, Sultan N. Comparison of efficacy of 50% TCA using CROSS technique with microneedling for the treatment of atrophic acne scars. *JSMDC Pak*. 2020;**16**(01):26-31.
9. Goodman GJ, Baron JA. Postacne scarring—a quantitative global scarring grading system. *J Cosmet Dermatol*.2006;**5**:48-52.
10. Chilicka K, Rusztowicz M, Szygula R, Nowicka D. Methods for the Improvement of Acne Scars Used in Dermatology and Cosmetology: A Review. *J Clin Med*. 2022; **11**(10):2744.
11. Dhollan N, Thirunavukkarasu V. Microneedling vs. chemical reconstructon of skin scars with trichloroacetic acid: a comparative study. *Int J Res Dermatol*. 2017;**3**:277-81.
12. Agarwal N, Gupta LK, Khare AK, Kuldeep CM, Mittal A. Therapeutic Response of 70% Trichloroacetic Acid CROSS in Atrophic Acne Scars. *Dermato Surg*. 2015;**41**:597–604.
13. Bhardwaj D, Khunger N. An Assessment of the Efficacy and Safety of CROSS Technique with 100% TCA in the Management of Ice Pick Acne Scars. *J Cutan Aesthet Surg*. 2010;**3**:93–6.
14. Al-Hamamy HR, Al-Dhalimi MA, Abtan AF. Evaluation of treatment of acne scars with 25% trichloroacetic acid chemical peel followed by manual dermasanding. *J Cosmet Dermatol* 2021;**20**:1750–5.
15. Tirmizi SS, Iqbal T, Mansoor M, Farooq N, Ather S, Fatima F, Kapadia N, Anwar A, Hashmi AA. Role of Microneedling in Atrophic Post-Acne Scars: An Experience from a Tertiary Care Hospital. *Cureus*. 2021;**13**:e12578.
16. Biesman BS, Cohen JL, Dibernardo BE, Emer JJ, Geronemus RG, Gold MH, Lehman AS, Pilcher BK, Monheit GD, Schlesinger TE, *et al*. Treatment of Atrophic Facial Acne Scars with Microneedling Followed by Polymethylmethacrylate-Collagen Gel Dermal Filler. *Dermatol Surg*. 2019;**45**:1570–9.
17. Schoenberg E, O'Connor M, Wang JV, Yang S, Saedi N. Microneedling and PRP for acne scars: A new tool in our arsenal. *J Cosmet Dermatol*. 2020;**19**:112–4.