Journal of Pakistan Association of Dermatologists.2023;**33(2)**:624-628.

Original Article

Procedural combination of TCA-CROSS and microneedling in the treatment of grade-III and IV acne scars

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Abstract

Objective Evaluating the therapeutic response of 100% TCA CROSS technique in combination with microneedling on icepick, rolling, boxcar acne scars and to evaluate the adverse effects of this therapy.

Methods The procedure carried out at the Department of Dermatology and Venereology, Baghdad Teaching Hospital during the period from October 2016 to December 2018. A total of Seventeen patients, seven patients defaulted for unknown reasons. Only 10 patients completed full treatment course. Scar assessment was done according to Leeds acne scar grading score system and Goodman's qualitative global scarring grading system. On subsequent visits, patient's satisfaction and physician satisfaction were recorded. At the follow up visit visual analogue score was done. Three sessions of TCA 100% (100gm in up to 100ml ethyl alcohol 70%) CROSS in combination with microneedling (microneedle roller were done with 4 week intervals between sessions. Two months after last session, a follow up visits was arranged.

Results According to Leeds acne scar grading score system, two patients had score 4, seven patients had score 5, one patient had score 6 before starting the study with mean and SD 4.9±0.53. At the follow up visits the following results were recorded 1 patient had score 3, seven patients had score 4, two patients had score 5 with mean and SD 4.1±0.53 (P-value=0.002). All patients all patients achieved a satisfaction of (>6/10). Visual analogue score of scar severity was done in which 3 patients had score 7 severity, 5 patients had score 8 severity, 2 patients had score 9 severity at the first visit. After the study was finished, visual analogue score was reported as 1 patient had score 4 severity, 6 patients had score 3 severity, 3 patients had score 2 severity (mean and SD changed from 7.9±0.7 before to 2.8±0.6 on the last visit(P=value 0.0000001). Minimal reversible side effects were recorded.

Conclusion The study showed that 100% of TCA CROSS technique in combination with microneedling is a safe and effective treatment in icepick, rolling, boxcar acne scars with minimal reversible side effects.

Key words
TCA-CROSS; Microneedling.

Introduction

An unfortunate sequelae of acne is residual scarring and disfigurement. Acne and acne scarring can have a detrimental impact on the quality of life and lead to feelings of

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embarrassment and low self-esteem.[1] Causes of acne scar formation can be broadly categorized as either the result of increased tissue formation or, more commonly, loss or damage of local tissue.[2] Clinical manifestations of acne scars as well as severity of scarring are generally related to the degree of inflammatory reaction to tissue damage and to time elapsed since the onset of tissue inflammation.[3,4]

Methods

This clinical, interventional, therapeutic study was carried out at the Department of Dermatology and Venereology-Baghdad Teaching Hospital during the period from October 2016 to December 2017. The nature of the study was explained for each patient with full explanation about the disease course, procedure of treatment, follow up, prognosis and the need for pre and post treatment photographs. Patients had skin type III and IV according to Fitzpatrick classification. Patients who had icepick, rolling, boxcar acne scars were included in the study. Patients who had tendency for keloid, active acne, herpes labialis infection, pregnant and lactating women and patients on systemic retinoid in the last 3 months were excluded from the study.

Seventeen patients were included in the study, 7 defaulted for unknown reasons. Only 10 patients completed the full treatment course (2 males and 8 females). Their ages ranged from 18 to 40 years with a mean age and SD of 27.6±6.2 years.

At the first visit scars assessment was done according to Leeds acne scar grading score system.[5] Patients were also assessed by Goodman's qualitative global scarring grading system.[6] In subsequent visits, physician satisfaction was noted and recorded on a scale system ranged from (1 to 10) in which 1 represented the minimal response while 10 maximal response. Also, patient's satisfaction was noted at each visit and recorded on a scale system ranging from (1 to 10) in which 1 represented the minimal satisfaction while 10 maximal satisfaction. Photography was done at each visit.

Two months after the last treatment session a follow up visit was arranged. Leeds acne scar grading score, Goodman's grading system, physician satisfaction, patient satisfaction and photography were done. Female patients were asked about the need for camouflage; whether camouflage stopped or decreased in amount.

Visual analogue score was calculated by another dermatologist by comparing 2 photos for each patient, one at the first visit before starting the treatment and the other at the follow up visit with a range from (1 to 10) in which 1 represented minimal severity and 10 maximal severity of the scars.

Procedure: At each visit the face was washed with soap and water. The face was then cleaned with alcohol. Lidocaine 10% cream applied to the treatment areas 30 minutes before procedure. The patient was asked to lie down, microneedling was done by using dermal roller. The skin was stretched with one hand, the other hand griped the roller and rolled it over the skin in two perpendicular directions. After finishing, patient rested for about 10-15 minutes then the face was washed with normal saline and alcohol swab again. Then the skin was stretched again, and 100% TCA (w/v 100gm/100ml) was applied with a syringe focally drop by drop at each scar by using insulin syringe gauge 30. Sessions were repeated every 4 weeks for a total of 3 sessions. Patients were kept on prophylactic topical antibiotic (Fusidic Acid 2% cream w/w) for 3-5 days after each session, sun avoidance was advised, and sunscreens were applied. Patients were asked to use hydroquinone 4% cream

lightly during the treatment period. Application of camouflage by female patients was allowed 24 hours after session.

Results

Leeds acne scar grading is shown on **Table 1**. The mean±SD was 4.9±0.53 before treatment and at follow up it became 4.1±0.53; P-value=0.002.

Patients Qualitative scars assessment was done according to Goodman and Baron Qualitative scar grading system **(Table 2)** in which mean, and SD was changed from 3.3±0.48 to 2.8±0.4 with a P value= 0.018.

Visual analogue score of scar severity (mean and SD changed from 7.9±0.7 before to 2.8±0.6 at follow up visit) **(Table 3)** while mode changed from 8 before to 3 at the end of the study. P value=0.0000001. At the end of the study 3 patients reported 6/10 satisfaction, 7 patients reported 7/10 satisfaction (mean and SD

Table 1 Number of patients according to Leeds score.

Score	*No. of patients*	
	Before	*Follow up*
3	0	1
4	2	7
5	7	2
6	1	0

Table 2 Number of patients according to Leeds score.

Grade	*No. of patients*	
	Before	*Follow up*
2	0	2
3	7	8
4	3	0

Table 3 visual analogue score.

Score	*No. of patients*	
	Before	*Follow up*
2	0	3
3	0	6
4	0	1
7	3	0
8	5	0
9	2	0

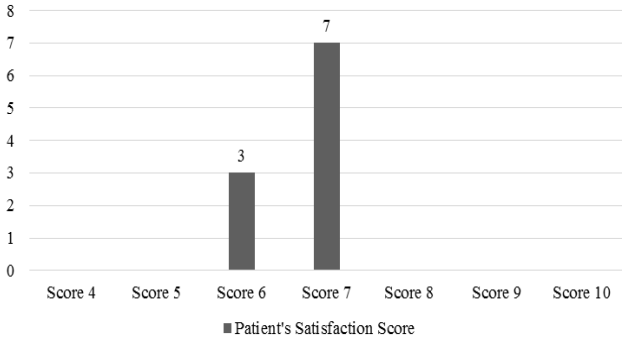

Figure 1 Patient Satisfaction.

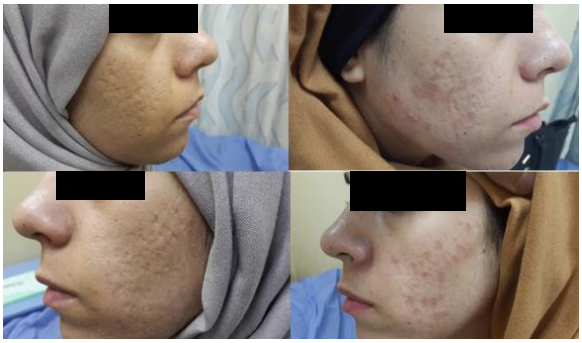

Figure 2 Twenty four years old female patient with grade IV acne scar, photo before (left side) and photo after 3 months (right side).

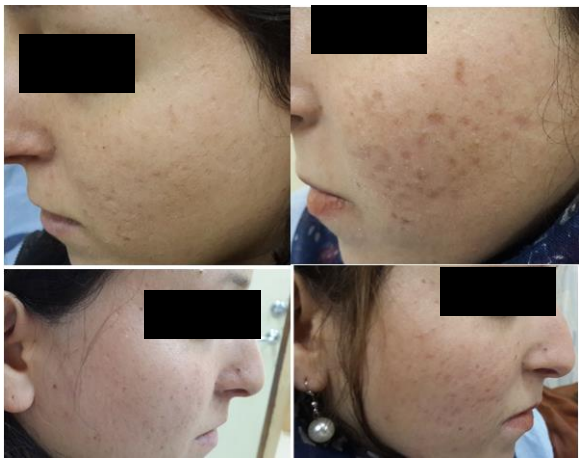

Figure 3 Twenty three years old female patient with grade IV acne scar, photo before (left side) and photo after 3 months (right side).

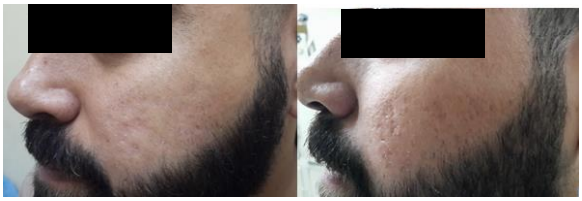

Figure 4 Twenty seven years old male patient with grade III acne scar, photo before (left side) and photo after 3 months (right side).

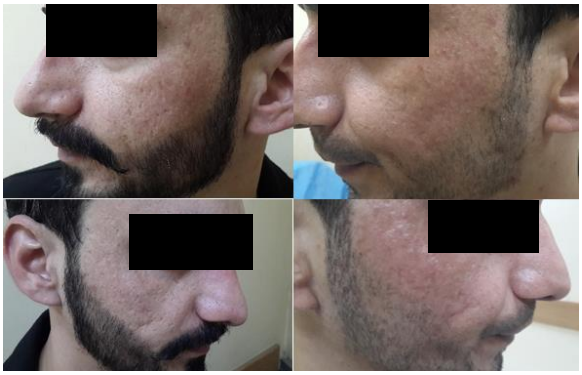

Figure 5 Twenty eight years old male patient with grade III acne scar, photo before (left side) and photo after 3 months (right side).

6.7±0.48) while 7/10 was the mode.

In the follow up visit, 8 patients recorded 7/10 satisfaction, 2 recorded 8/10 satisfaction (mean and SD 7.2±0.42) while the mode was 7/10. All female patients stated that they were using less amount of camouflage than before **(Figure 1-5)**.

Discussion

Acne scaring is a common cause of psychosocial embarrassment, especially in young age. The psychological trauma of acne scarring may lead to emotional debilitation, poor self-esteem, social isolation, and frustration. There is no gold standard for treatment of acne scars, the CROSS technique is advocated as a relatively safe procedure for acne scars treatment and can be combined with other modalities of treatment like subcision, microneedling and lasers.[7,8]

In the present study TCA was combined with microneedling. Nofal *et al.* in a study in Egypt 2014 compared the results of patients treated with platelets rich plasma, a second group treated with TCA CROSS 100% and a third group treated with combination of platelets rich plasma and microneedling. The study showed that there was no statistically significant difference in the degree of improvement among the 3 groups.[9]

Ramadan *et al*. (2011) compared subcision versus 100% TCA CROSS in 20 patients. The results showed decrease in size and depth of scars. The subcision showed better results than the 100% TCA CROSS.[10]

Another study in India 2014, Garg *et al*. treated 50 patients whose score were graded according to Goodman grading. Microneedling and 15% TCA peel was done alternatively at 2-weeks interval for a total of 6 sessions after subcision. There were (62.5%) patients with grade 4 improved to Grade 2 and (37.5%) patients improved to Grade 3 scars. Out of 22 patients with Grade 3 scars, (22.7%) patients were left with no scars, (9.1%) patients improved to Grade 1and (68.2%) patients improved to Grade 2. All 11 patients with Grade 2 scars were left with no scars.[(11)] While in our study; 10 patients with grade 3 and grade 4 improved to grade 3 and grade 2 respectively.

Agarwal *et al*. (2015) in a study from India showed that there was good improvement (>50%) in 66% of 53 patients according to physician and patients satisfaction when treated with 70% TCA CROSS. The patients were satisfied in 81.1% of cases.[12] While in the present study all patients achieved a satisfaction of (>6/10).

The improvement in the scar after TCA application can be explained by the increased production and reorganization of collagen that leads to increased dermal volume. Collagen remodeling continues for several months after TCA application. Continuous collagen remodeling with an increase in its volume will help in the scar remodeling and filling-up the scar tissue after TCA CROSS technique.[13]

Microneedling involves the use of a handheld dermal roller with tiny needles which create many superficial puncture wounds in the skin.

According to the length of the needles, it penetrates the dermis and a chemical cascade initiated. This leads to many growth factors production like transforming growth factors alpha and beta, fibroblast growth factors, platelet-derived growth factors. All these lead to fibroblasts invasion in the scared skin.[14] This results in more production of collagen and elastin. Keratinocytes also migrate across the epidermal defect and proliferate. Few days after injury, a fibronectin matrix is laid down and collagen deposited in the upper papillary dermis below the basal layer. Type III collagen is the main form in early wound-healing phase. Tissue remodeling continues for several months, accomplished by the fibroblasts. Type III collagen is gradually replaced by type I collagen after more than one year.[15,16]

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