

Comparative study of dermaroller therapy versus trichloroacetic acid CROSS for the treatment of atrophic acne scars

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Abstract *Objective* To compare the efficacy and safety of dermaroller treatment with that of TCA CROSS in acne scars.

Methods We selected thirty patients of atrophic acne scars for the study. Group I patients underwent four sessions of dermaroller therapy four weeks apart. Group II were treated with four sessions of TCA CROSS technique four weeks apart.

Results After four sessions of dermaroller and TCA CROSS each, marked improvement was seen in 40% patients in the dermaroller group and in 60% patients in the CROSS group. Moderate improvement was seen in 40% patients in dermaroller group and in 26.6% patients in the CROSS group and mild improvement was seen in 20% patients in dermaroller group and 13.3% patients in the CROSS group. Side effects were mild and infrequent in both groups.

Conclusion Both treatments are equally effective and safe for the treatment of acne scars.

Key words

Acne scars, dermaroller, TCA CROSS, atrophic, improvement.

Introduction

Atrophic acne scarring is an unfortunate, permanent complication of acne vulgaris, which may be associated with significant psychological distress.^{1,2,3} Dermatologists are frequently presented with the challenge of evaluating and providing treatment recommendations to patients with acne scars. Atrophic acne scars are by far the most common type.⁴ The pathogenesis of atrophic acne scarring is not completely understood, but is most likely related to inflammatory mediators and enzymatic degradation of collagen fibers and subcutaneous fat. It is not clear why some acne patients

develop scars while others do not, as the degree of acne does not always correlate with the incidence or severity of scarring.^{5,6} The scarring process can occur at any stage of acne; however, it is uniformly believed that early intervention in inflammatory and nodulocystic acne is the most effective way of preventing post-acne scarring. Once scarring has occurred, it is usually permanent.^{7,8,9}

Dermaroller or microneedling is a wonderful and brilliant device to induce new collagen formation and improve wrinkles, acne scars, pigmentation and chicken pox scars.^{10,11} The standard dermaroller used for acne scars is a drum-shaped roller studded with 192 fine microneedles in eight rows, 0.5-1.5 mm in length and 0.1 mm in diameter.¹² In TCA CROSS focal application of 70% TCA

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concentration is done by pressing hard on the entire depressed area of atrophic acne scars using a sharpened wooden applicator.¹³

The aim of present study was to compare dermaroller technique versus TCA CROSS technique for the treatment of acne scars.

Methods

We selected thirty patients of atrophic acne scars for the study. The patients were divided into two groups of 15 patients each. Informed written consent was taken from all patients before the study and prior approval of hospital ethical committee was taken for the study. The following patients were excluded from our study: patients on oral retinoids, those having herpes labialis, active acne or keloidal tendency. The patient's skin type was noted, as patients with Fitzpatrick skin types III to VI have a higher risk of postinflammatory hyperpigmentation (PIH) with many resurfacing procedures.

Group I patients underwent four sessions of dermaroller therapy four weeks apart. Group II patients were treated with four sessions of trichloroacetic acid CROSS technique four weeks apart.

In group I patients, a sterile rolling device with needles of length 1.5 to 2.5mm was rolled across the skin with pressure in multiple directions until the area demonstrates uniform pinpoint bleeding through thousands of micropuncture sites. Prior to the treatment, topical anesthetic was applied for one hour. After the procedure, the area was cleansed with saline-soaked gauze and an occlusive ointment was applied.

In group II patients, a technique consisting of the focal application of higher TCA concentrations by pressing hard on the entire depressed area of

atrophic acne scars was done. This technique is called chemical reconstruction of skin scars (CROSS). Focal application of 70% TCA concentrations by pressing hard on the entire depressed area of atrophic acne scars using a sharpened wooden applicator was done. After CROSS, an ointment based antibiotic instead of an occlusive dressing was applied for moisturizing effect, but this application was discontinued after crust formation in order to avoid the risk of detaching the crust. Strict sun protection and application of sunscreen lotions were advised. The adverse effects were noted in both the groups.

The grading of acne scars was done clinically and by serial photographs. The improvement of the patients was categorized as follows: excellent, improvement greater than 70%; good, improvement of 50-70%; fair, improvement of 30-50%; poor, improvement less than 30%. Patients were also asked to fill a questionnaire based on a 10-point scale starting from 0-10.

Results

Table 1 shows the demographic data of study population. In our study, most of the patients (18.6%) were between 21-30 years of age, 6 (20%) were between 31-40 years and 6 (20%) patients were between 11-20 years of age. Females outnumbered males and female to male ratio was 4:1.

After four sessions of dermaroller and TCA CROSS, marked improvement was seen in 40% patients in the dermaroller group (**Figure 1a** and **1b**) and in 60% patients in the CROSS group (**Figure 2, 2a** and **2b**). Moderate improvement was seen in 40% and 26.7% patients in dermaroller and CROSS groups, respectively (**Table 2**). Mild improvement was noticed in 20% and 13.3% patients, respectively.



Figure 1a Acne scars along with few active lesions.



Figure 1b Marked improvement in acne scars after dermaroller treatment.

Table 1 Sex and age distribution of study population (n=30).

	N (%)
Sex	
Female	24 (80)
Males	6 (20)
Age (years)	
11-20	6 (20)
21-30	18 (60)
31-40	6 (20)

Table 2 Grades of improvement after treatment.

Improvement	Group I (n=15)	Group II (n=15)
Marked	6 (40%)	9 (60%)
Moderate	6 (40%)	4 (26.7%)
Mild	3 (20%)	2 (13.3%)

Group I: dermaroller and group II TCA CROSS treatment.



Figure 2a, 2b and 2c Marked improvement in acne scars after TCA CROSS therapy.

Table 3 Grades of improvement after treatment.

Adverse effects	Group I (n=15)	Group II (n=15)
Erythema	3 (20%)	-
Hyperpigmentation	-	2 (13.3%)
Pain and edema	1 (6.7%)	-

Group I: dermaroller and group II TCA CROSS treatment.

Milder side effects were seen in 4 patients in group I, erythema (20%) and pain and edema

after the procedure (6.7%). Hyperpigmentation was seen in 2 (13.3%) patients in TCA CROSS group (**Table 3**). It was also seen that in dermaroller group, good response was seen in rolling and boxcar scars whereas in the TCA CROSS group, good response was seen in the patients with ice-pick scars.

The difference in the degree of improvement between the two groups was not statistically significant. However, the satisfaction rate was better in the patients treated with TCA CROSS technique.

Discussion

Our results show that both dermaroller and TCA CROSS treatments are effective and safe modalities for atrophic acne scars.

Atrophic acne scars are divided into the following three main types: 1) ice-pick, 2) rolling, and 3) boxcar scars. It is common for patients to have more than one type of scar.^{14,15} Skin needling, also called “collagen induction therapy” or dermaroller technique is the technique of rolling a device composed of a barrel studded with hundreds of needles, which create thousands of micropunctures in the skin to the level of the papillary to mid-dermis. The proposed mechanism by which skin needling improves acne scars is as follows: the dermal vessels are wounded, causing a cascade of events including platelet aggregation, release of inflammatory mediators, neutrophil, monocyte, and fibroblast migration, production and modulation of extracellular matrix, collagen production and prolonged tissue modulation.

Compared to other resurfacing procedures, dermaroller technique has many advantages. First, it is reported to be safe in all skin types and to carry the lowest risk of PIH.¹⁶ Generally, the skin oozes for less than 24 hours and then remains erythematous and edematous for 2 to 3

days. Usually, three or more treatments are required to achieve optimal clinical benefit, separated by four-week intervals. Second, the treatment does not result in a line of demarcation between treated and untreated skin, as usually occurs with other resurfacing procedures. This allows for specific areas of scarring to be treated without the need to treat the entire face or to “blend” or “feather” at the treatment edges. Third, the recovery period of 2 to 3 days is significantly shorter than other resurfacing procedures. Finally, needling is much less expensive to incorporate into a practice compared with a fractional laser or dermabrasion.

The CROSS technique is used for ice-pick and narrow boxcar scars.¹⁷ A high-strength trichloroacetic acid (TCA) peel solution is placed in the base of these scars to ablate the epithelial wall and to promote dermal remodeling. Of interest is that rather than being equivalent to the classic full-face chemical resurfacing, this technique can be used on focal chemical scar reconstruction.^{18,19} Moreover, this technique can avoid scarring and reduce the risk of developing hypopigmentation by sparing the adjacent normal skin and adnexal structures. Repeated CROSS application can normalize deep rolling and boxcar scars, and a similar result can be achieved for deep ice-pick scars with higher TCA concentrations of up to 100%. Because clinical improvement is proportional to the number of courses of CROSS treatment, this method is effective for the treatment of all deep acne scar types.

A mistake in the initial consultation would be to promise a certain level of improvement in acne scars or to minimize the downtime and discomfort associated with each procedure that is considered. Patients are most likely to be satisfied with their outcome (even if they have only marginal results) if the physician can help them understand the unpredictability of acne

scar therapy and develop realistic expectations for improvement. Having an approach to efficiently evaluate and develop an appropriate treatment plan for these patients will increase the chances for patient satisfaction. Setting the appropriate expectations and goals for improvement is imperative during the initial consultation. Prior to the initiation of any procedures, it is of utmost importance to frankly discuss the unpredictability of results in acne scar therapy and the possible need for multiple procedures over a period of time. Selecting the most appropriate procedures for each lesion type will increase the chance of success. In addition, side effects of each procedure planned should be discussed in detail. The risks of infection, hyperpigmentation, prolonged erythema, swelling, and poor healing/scarring are present with many procedures and should be understood by the patient.

Conclusion

The physician should emphasize to the patient the unpredictability of acne scar treatment, specifically, that there is usually no quick, easy, and permanent fix to this problem. While there are many effective treatments for many patients, not all improve with a specific procedure or groups of procedures. Usually, multiple procedures are required and some procedures may need to be repeated at certain intervals to maintain the improvement.

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