Original Article

An objective assessment of microneedling therapy in atrophic facial acne scars

ABSTRACT

Context: Microneedling therapy is one of the recent advances in treating acne facial scars.

Aim: To evaluate the efficacy of microneedling therapy in the treatment of atrophic acne facial scars.

Settings and Design: A total number of 10 patients between the age group of 20 and 40 years (8 women and 2 men) who complained of acne scars from November 2012 to August 2014 were selected for the study.

Subjects and Methods: Microneedling therapy was performed following the application of the Eutectic Mixture of Local Anesthetics in an interval of 2 months. All patients underwent three sessions. A follow-up of 2 months after the last sitting was carried out.

Statistical Analysis: Cochran's Q-paired test, Kendall's W-test, and Pearson's correlation were used for statistical analysis.

Results: Patients in our study had three forms of acne scars: box-scar, icepick form, and rolling scars. Patients were told to rate the outcome of the treatment at the end of the follow-up. Three observers randomly selected were shown the pre- and postoperative photographs of the patients to rate the treatment outcome. Statistically there was no interobserver bias. Ninety percent reduction in number of scars and depth of scars was noted at the end of three sittings. The improvement in pigmentation was insignificant. Seventy percent improvement in the skin texture was noted. Nine patients suffered from transient postinflammatory erythema and six patients had postoperative swelling.

Conclusion: Microneedling therapy is a safe and effective method of treating acne scars.

Keywords: Acne scar, dermaroller, microneedling therapy

INTRODUCTION

There are two types of acne scars, hypertrophic and atrophic.[1] Jacob *et al*. classified atrophic scars into three types: icepick, rolling, and box scar.[2] The earliest form of microneedling, acupuncture, can trace its roots to the Chinese centuries ago. Prof. Horst Liebl integrated nearly 200 nontraumatic microneedles of medical grade into a drum shaped device called dermaroller.[3] Orientreich DS and Orientreich N introduced subcutaneous incisionless technique to treat depressed scars and wrinkles.[4] Fernandes came forth with percutaneous collagen induction (PCI) therapy as an alternative to laser resurfacing to treat acne scars and wrinkles. According to him, advantages include preservation of the epidermis, a short healing phase, and the use of local anesthetic alone.[5] Fernandes came forth with percutaneous collagen induction (PCI) therapy as an alternative to laser resurfacing to treat acne scars and wrinkles. According to him, advantages include preservation of the epidermis, a short healing phase, and the use of local anesthetic alone.[6]

SUBJECTS AND METHODS

This study was conducted on the individuals who reported

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to our department of oral and maxillofacial surgery on an outpatient basis with the chief complaint of acne scars from November 2012 to August 2014. All patients recruited were proposed to undergo microneedling therapy. Ten patients, with male:female ratio 1:4, having atrophic facial acne scars were included in the study. The diagnosis was made on the clinical basis. Their ages ranged between 21 and 33 years with a mean of 25.5 years. All patients had acne scarring for more than a year and none had undergone any treatment for the same. Consent was obtained from the all participants in the study. A detailed history was taken from each patient stressing the time of onset of scarring. Only healthy individuals who had no other comorbidities were included in the study. Pregnant and lactating mothers as well as patients with keloidal tendencies were excluded from the study. The skin types of patients were classified according to Fitzpatrick's classification types. The scars were classified according to the classification given by Jacob *et al*. Ethical clearance obtained from - Ethics Committee, Refrence Number:YUEC 175/11/12/12. Dated 11-12-2012.

Armametrium used – EMLA cream (eutectic mixture of 2% lignocaine and 2%prilocainev) Figure 1a and dermaroller (Derma India, Tamil Nadu, India containing titanium coated tips of stainless steel needles). Figure 1b- (non collobaration).

EMLA cream was applied on the scarred area under occlusion of a thin plastic sheet as seen in Figure 1c.

Figure 2a shows pre-operative scarred area of our patient which was cleaned with gauze and normal saline and patted dried. Eutectic mixture of lignocaine 2% and prilocaine 2% cream was applied under occlusion with the help of a transparent strip which comes along in the packaging of the cream on the areas affected by acne scarring [Figure 2b]. This cream was later removed using gauze dipped in saline after an hour. The dermaroller was rolled on to the skin by the operator while the assistant stretched the skin so that the base of the scars could be reached [Figure 2c]. Minimal pressure was applied to the dermaroller and the movements were restricted to the scarred areas. Care was taken to avoid applying lateral pressure while rolling the instrument on the skin to avoid scarring.

The instrument was moved backward and forward 6–10 times in four directions: horizontally, vertically, diagonally right, and diagonally left to cover an area of roughly 2 × 2 inches until uniform pinpoint bleeding was seen Figure 1c. This uniform pinpoint bleeding was taken as the endpoint. The serous ooze was wiped and the area was cleansed with moist gauze. Microneedling was performed once in 3 weeks for a total of three sessions in all the patients. No premedication or sedation was required. Patients were given a questionnaire to evaluate the postoperative complications, improvement in the skin texture, and scars in the treated areas after each session. The patients were instructed to avoid sun exposure as much as possible for the next 3 weeks and were encouraged to use a medicated sunscreen with sun protection factor of 30spf for 2 weeks posttreatment. Patients were asked not to apply any ointments apart from sunscreen and soaps on the treated area for 3 days after the session.

Digital color facial photographs were taken using a Sony Cyber-shot digital camera (DSC-W50, Sony Corp., Tokyo, Japan). Frontal and lateral profile views with visibly scarred dermis were obtained pretreatment Figures 3a,4a,5a- left lateral and Figures 3c,4c,5c – right lateral and 3 weeks post treatment of 3rd siting, with each sitting done with a gap of 3 weeks Figures 3b,4b,5b –left lateral and Figure 3d,4d,5d- right lateral. Three observers were randomly selected and were asked to assess the outcome using a visual analog scale from 0 to 10.

As per Table 1 (Cochrane Q test) showed improvement in scars i.e. reduction in the number of scars as assessed by obervers with help of visual photographs. There was not much change seen in the pigmentation or the depth of the

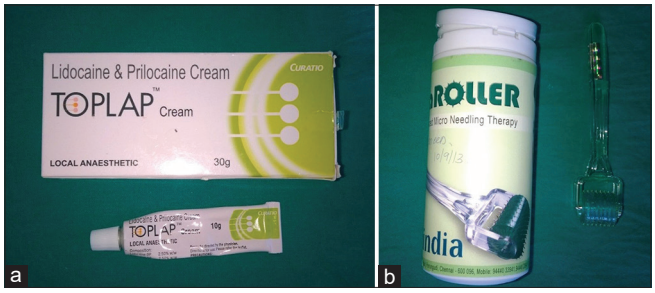

Figure 1: (a) EMLA cream. (b) Dermaroller

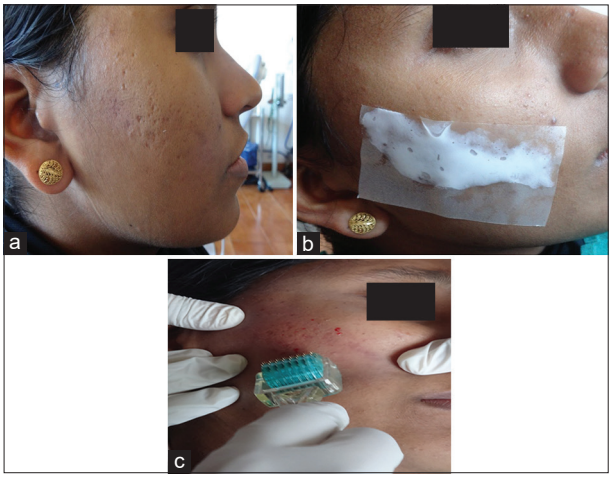

Figure 2: (a) Preoperative photograph. (b) Application of EMLA cream. (c) Microneedling in all directions with dermaroller

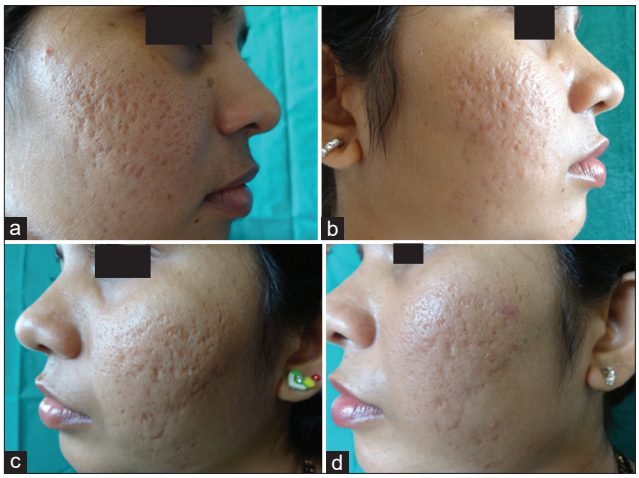

Figure 3: (a) Patient 1 preoperative right side. (b) Patient 1 postoperative right side. (c) Patient 1 preoperative left side. (d) Patient 1 postoperative left side

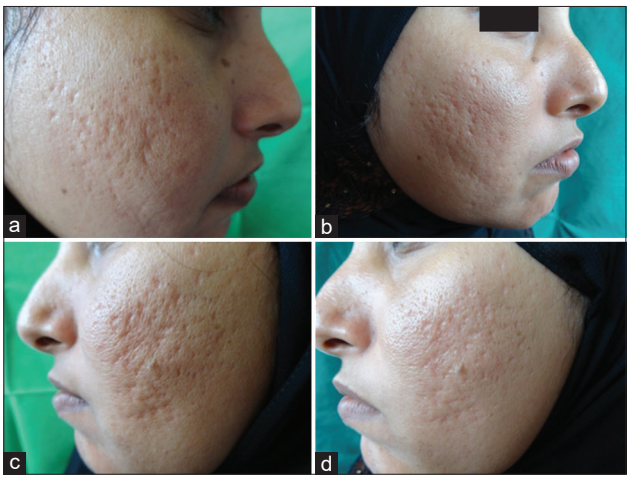

Figure 4: (a) Patient 2 preoperative right side. (b) Patient 2 postoperative right side. (c) Patient 2 preoperative left side. (d) Patient 2 postoperative left side

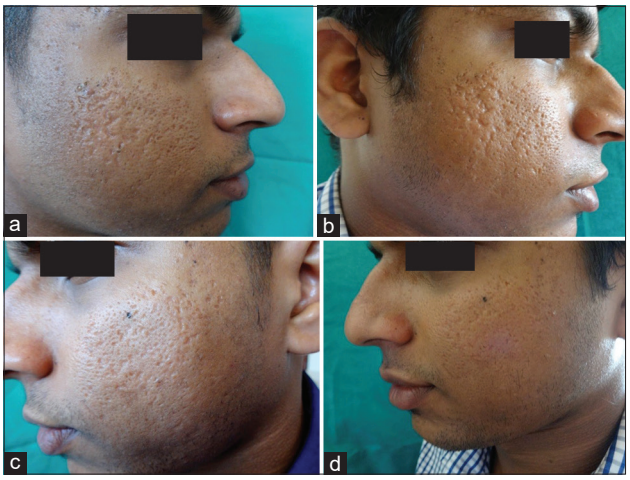

Figure 5: (a) Patient 3 preoperative right side. (b) Patient 3 postoperative right side. (c) Patient 3 preoperative left side. (d) Patient 3 postoperative left side

scars after three sittings as shown in Table 2 by (Kendall's W test) and Table 3 (Cochrane Q test) respectively, however a

Table 1: Reduction in number of scars

	Frequency (%)			*P* (Cochrane Q)
	1a	1b	1c	
No	3 (30.0)	2 (20.0)	1 (10.0)	0.368
Yes	7 (70.0)	8 (80.0)	9 (90.0)	
Total	10 (100.0)	10 (100.0)	10 (100.0)	

Table 2: Pigmentation

	Frequency (%)			*P* (Kendall's W)
	2a	2b	2c	
Increased	0 (0)	2 (20.0)	1 (10.0)	0.717
Decreased	3 (30.0)	2 (20.0)	2 (20.0)	
Same	7 (70.0)	6 (60.0)	7 (70.0)	
Total	10 (100.0)	10 (100.0)	10 (100.0)	

Table 3: Reduction in the depth of the scar

	Frequency (%)			*P* (Cochrane Q)
	3a	3b	3c	
No	4 (40.0)	0 (0)	1 (10.0)	0.039
Yes	6 (60.0)	10 (100.0)	9 (90.0)	
Total	10 (100.0)	10 (100.0)	10 (100.0)	

Table 4: Improvement of skin texture

	Frequency (%)			*P* (Cochrane Q)
	4a	4b	4c	
No	3 (30.0)	1 (10.0)	3 (30.0)	0.368
Yes	7 (70.0)	9 (90.0)	7 (70.0)	
Total	10 (100.0)	10 (100.0)	10 (100.0)	

satisfactory improvement in skin texture scars was seen as per Table 4 (Cochrane Q test). Table 5 shows Minimum score and maximum score given by the observers in regards to improvement seen in the treatment and Pearson Correlation test was used to evaluate the interobserver bias.

10 Observers were given a YES & NO QUESTIONNAIRE
1a,2a, 3a,4a-, 3 weeks post 1st sitting of patients as compared to pre-treatment
1b,2b.3b.4b-3 weeks post 2nd sitting as compared to post 1st sitting
1c,2c,3c,4c-3 weeks post 3rd sitting. As compared to post 2nd sitting
1-overall reduction in the number of scars
2-changes in pigmentation of skin in scarred area.

RESULTS

As per Table 1 the *P* (Cochrane test) showed improvement in scars i.e reduction in the number of scars as assessed by obervers with help of visual photographs. There was not much change seen in the pigmentation or the depth of the scars after three sittings as shown in Tables 2 and 3 respectively,

Table 5: Minimum score given by the observer and maximum score given as regards to improvement seen in the treatment

	n	Minimum	Maximum	Mean	SD	Intra class correlation coefficient	Significance
OBSERVER 1	10	5	8	6.80	1.033	0.292	0.254
OBSERVER 2	10	6	8	6.90	0.568		
OBSERVER 3	10	6	8	7.10	0.738		
Valid *N* (listwise)	10						

SD: Standard deviation

however a satisfactory improvement in skin texture scars was seen as per Table 4. In their self-evaluation questionnaire, patients considered the outcome of the treatment as good. Of 10 patients, 6 found the procedure to be painful. Common adverse events recorded were redness which lasted a few hours after the procedure and four patients complained of swelling postoperatively. Three observers were shown the pre- and postoperative photographs and asked to assess the outcome of the treatment on a scale of 10. Based on this, three photographs were graded as excellent outcome and the rest showed good outcome. Even though interobserver agreement with respect to postoperative assessment as shown in Table 5 was low (0.292), the difference was not statistically significant ($P = 0.254$).

DISCUSSION

Treating acne scars, according to Fulton, "is perhaps the most difficult cosmetic surgery procedure that exists".[6] The main treatment goal is to obtain as much improvement as possible rather than perfection. A qualitative global acne scarring grading system was first presented by (Goodman GJ, Baron JA) that is simple to use and may help optimize therapeutic intervention . Patients differ considerably in their abilities to withstand the psychological, social, and occupational effects of both acne and its consequent scarring,[7] hence it is of utmost importance to have effective and satisfying treatments in the physician's armamentarium. The best treatment for acne scarring is prevention through early treatment of active acne.[8] Establishing realistic expectations for your patient is vital, as it is impossible to completely remove scars.[9]

The epidermis is an extremely complex, highly specialized organ. It may be only 0.2 mm thick, but it is our sole protection from the environment. We should never damage the epidermis unless the risk of leaving the epidermis intact is greater than the risk of removing it.[5] Dermaroller does not damage the skin or remove the epidermal layer. One single microneedling causes tiny wound in skin and as a result of posttraumatic response platelets are released, which produce a series of growth factors that promote the body's own production of collagen and elastin.[10] A research by Fabbrocini *et al*., investigating acne scar treatment through dermal roller, has also been revealed. A study done in 32 patients (20 women, aged 17–45 years) showed significant improvement in scar severity and overall esthetic improvement after two microneedling sessions. Scar depth was evaluated by the analysis of digital photography, and in a few cases, examining microrelief impressions is made from silicone rubber. The treatment protocol included topical vitamin therapy for 3 weeks before the first session, and no pigmentary complications were noted.[11]

The main result of this study showed that PCI (microneedling therapy) appears to be a simple and encouraging method for treating acne scars. We did not combine any other treatments along with the microneedling. It is cost effective with few or no side effects. The treatment was painful at times despite the application of local anesthesia owing to increased depth of the scars. The postoperative complications were pain, erythema, and swelling lasting for a few hours after the procedure. More recently, the tramline effect[12] which has been documented was not reported in any of our patients. Fernandes recommends postoperatively soaking the skin with saline swabs for an hour or 2 hrs and then cleaning the skin thoroughly with a Tea Tree Oil cleanser. He also suggested that the patients should avoid direct sun exposure for at least 10 days if possible and use a broad-brimmed hat or scarf to protect the facial skin.[5] In our study, we gave icepacks to our patients rolled in sterile gauze piece and asked them to apply for 5–10 min till the bleeding completely stopped. The patients were instructed to avoid sun exposure for 10 days following the procedure. We prescribed a medicated sunscreen to all our patients and instructed them to use it whenever they would be getting exposed to the sun, as postoperative care. It is difficult to satisfy the patient with high expectations since the treatment does not completely erase the scars but helps in decreasing their severity. We found that the patients who were self-motivated accepted the treatment and were satisfied with their results. The icepick and box scars responded better than the rolling type of scars. In box scars, the change in size and depth is appreciable. However, Sharad had reported no significant change in deep icepick scars after microneedling therapy.[13] There were no chances of cross infection as each patient was treated with a new instrument. The patients could resume their daily activities immediately after the treatment.

CONCLUSION

The choice of treatment of postacne scars depends both on the morphological type and on the severity of each scar present on the face.[13] There are no general guidelines available to optimize acne scar treatment. Thus, it is important to realize that a typical patient has scars of different morphological types and grades and it is difficult to treat all these scar types satisfactorily with a single treatment option and multiple treatment modalities may be required. Further primary research such as randomized controlled trials is needed to quantify the benefits and to establish the duration of the effects, the cost-effective ratio of different treatments, and the evaluation of the psychological improvement and the quality of life of these patients.

Declaration of patient consent

The authors declare that they have obtained consent from patients. Patients have given their consent for their images and other clinical information to be reported in the journal. Patients understand that their names will not be published and due efforts will be made to conceal their identity but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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