SKIN NEEDLING THERAPY IS AN EFFECTIVE TREATMENT FOR ATROPHIC FACIAL ACNE SCARS

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ABSTRACT

Background

Acne is a common condition seen in up to 80% of people between 11 and 30 years of age. In some patients, the severe inflammatory response results in permanent scars. Atrophic facial scars are always a challenge to treat. Skin needling therapy is a new, simple and an effective treatment for such scars.

Objective

To assess the efficacy of skin needling in the management of grade 2 and 3 atrophic facial acne scars.

Patients and methods

Twenty five patients with facial acne scars were enrolled in the study (17 female and 8 male patients; age range 14–42 years). The severity of the lesions in each patient was scored on a 10-point scale (0 = no lesions; 10 = maximum severity) by the researcher involved in the study. Three groups of patients were identified and patients with Grade 2 and 3 atrophic facial acne scars were included. Patients were treated with skin needling procedure. Four photographs were taken for each patient by the researcher; one before, one immediately after the procedure done and another one after one month from the first session then one month after the second session of the treatment. At every follow-up, the same researcher evaluated the scars, scoring them using the same scale as previously, to assess any clinical improvement in the severity of the lesions. The last follow-up was conducted one month after the second treatment then the photographs were compared with the photographs taken before the first treatment and each patient was given a new severity score.

Results

One month after the first session of skin needling; all patients had smoother facial skin and a slight reduction in lesion severity. One month after the second session of skin needling, the improvement in the acne rolling scars was evident as photographic comparison in each group of patients showed that the skin became thicker; and independent of the lesion grading the relative rolling scar depth was significantly reduced

Conclusion

Skin needling therapy is a simple, cheap, office method and an effective treatment for atrophic facial acne scars.

Keywords: *Atrophic facial acne scars, Skin needling therapy* .

Synonyms for skin needling: The followings are many names for the same treatment: Microneedling Therapy, Collagen Induction Therapy (CIT), Dermaroller Therapy, Needle Dermabrasion, Percutaneous Collagen Induction (PCI), Multitrepannic Collagen Actuation (MCA), Dry Needling or Collagen Needling.

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INTRODUCTION

Acne is a common condition seen in up to 80% of people between 11 and 30 years of age and in up to 5% of older adults. In some patients, the severe inflammatory response results in permanent scars. Scars can involve textural change in the superficial and deep dermis [1]. In Sulaimani city (Iraq) the frequency of acne was found to be 9.2% [2].

Atrophic acne scarring is the most common form, especially on the face [3]. Histologically, atrophic acne scars exhibit thinning of the skin and loss of collagen, elastin, and deep dermal fat resulting in a downward pull of the epidermis [4].

Since 2006, a clinical grading system has been devised to grade the severity of post-acne facial scars (Table 1). This grading system, proposed by Goodman and Baron, encompasses all the morphological types of post-acne scars and uses a simple clinical examination as the tool to grade the scars on objective lines [5].

Table 1. Grading of atrophic scars.

Grade of Atrophic Scars	Clinical picture
Grade 1	Macular erythematous, hypo or hyperpigmented scars
Grade 2	Mild atrophy not obvious at social distances of >50 cm or easily covered by facial makeup or beard hair
Grade 3	Moderate atrophy obvious at social distances of >50 cm; not easily covered by makeup or beard hair, but able to be flattened by manual stretching
Grade 4	Severe atrophy not flattened by manual stretching of skin

Facial scarring has always been a challenge to treat and there are different treatment options for the management of these scars. Treatment options like laser resurfacing or dermabrasion that offer significant improvement in facial scars are invariably associated with considerable morbidity and downtime interference with the daily activities of the patient in the post-treatment period [6, 7]. On the other hand, treatments like microdermabrasion and non-ablative resurfacing with lasers that are associated with a minimal or no downtime, do not show the same level of efficacy as the traditional, ablative resurfacing techniques [8, 9].

Dermaroller is a device used for the treatment of scars. There are some pathological as well as clinical studies now available in the world literatures that have documented a favorable clinical and histopathological response in the skin after dermaroller treatment [10, 11].

During treatment, the dermaroller needles pierce the stratum corneum and create microconduits (holes) without damaging the epidermis. It has been shown that rolling with a dermaroller (192 needles, 200 μm length and 70 μm diameter) over an area for 15 times will result in approximately 250 holes/ cm^2 . Microneedling leads to the release of growth factors which stimulate the formation of new collagen (natural collagen) and elastin in the papillary dermis. In addition, new capillaries are formed, this neovascularisation and neocollagenesis following treatment leads to reduction of scars [12, 13, 14].

The aim of this study was to assess the efficacy of dermaroller in the management of grade 2 and 3 atrophic facial scars.

PATIENTS AND METHODS

The study was conducted in 2012 at the researcher's private clinic aesthetic center in Sulaimani City– Iraq. Twenty five patients with facial acne scars were enrolled in the study (17 female and 8 male patients; age range 14–42 years). The severity of the lesions in each patient was scored on a 10-point scale (0 = no lesions; 10 = maximum severity) by the researcher involved in the study using the Goldman and Barron classification [5] (Table 1).

Three groups of patients were identified and patients with grade 2 and 3 atrophic facial acne scars were included (Table 2).

Group A comprised 12 patients with a severity score of > 7 (grade 3; severe rolling scars);

Group B comprised 8 patients with a severity score of 5–7 (grade 2; moderate rolling scars); and

Group C comprised 5 patients with a severity score of < 5 (grade 2; mild rolling scars)

Table 2. 25 patients with their scores and grades.

Group A (12 patients)		Group B (8 patients)		Group C (5 patients)	
Score Before Skin Needling	Grading Before Skin Needling	Score Before Skin Needling	Grading Before Skin Needling	Score Before Skin Needling	Grading Before Skin Needling
10	3	7	2	4	2
10	3	7	2	4	2
10	3	7	2	4	2
9	3	5	2	4	2
10	3	7	2	4	2
9	3	7	2		
10	3	7	2		
10	3	7	2		
10	3				
10	3				
10	3				
10	3				

Patients with grade 4 facial acne scar (severe atrophy not flattened by manual stretching of skin), keloid scarring, diabetes mellitus, neuromuscular disease, bleeding disorder, collagen vascular disease, corticosteroid or anticoagulant treatment, presence of skin cancers, warts, solar keratoses or any skin infection and pregnancy were excluded.

Patients were treated with the needling tool (figure 1) (MT Roller, model MT); MT15 (1.5 mm) or MT 20 (2 mm); (USA), which comprised a rolling barrel 2 cm x 2 cm wide, equipped with 192 needles (length 2 mm, diameter 0.25 mm) in 8 rows and 24 circles. Depending on the applied pressure, the needles penetrated the scar tissue to a depth of 1.5 mm or 2 mm.

Four photographs were taken for each patient by the researcher; one photograph before, one immediately after the procedure done and another after one month from the first session then finally one photograph one month after the second session of the treatment.

In each session patients were prepared in a similar manner to a surgical procedure; the facial skin was disinfected, then a topical anesthetic was applied, which was left for 60 minutes.

Skin needling procedure

The treatment was then carried out by rolling the dermaroller over the areas affected by acne scars, four times in four different directions: horizontally, vertically, and diagonally right and left. This ensured an even pricking pattern, resulting in about 250–300 pricks/cm^2.

Figure 1. Needling tools.

The microneedles penetrated through the epidermis but did not remove it. The epidermis is only punctured and healed rapidly. The needles seem to separate the cells from each others rather than cut through them, and thus many cells are spared. Because the needles are set in a roller, every needle initially penetrates at an angle and then goes deeper as the roller turns.

Finally the needle is extracted at a converse angle, therefore curving the tracts and reflecting the path of the needle as it rolls into and then out of the skin for about 1.5–2 mm into the dermis. The epidermis, and particularly the stratum corneum, remains intact except for the minute holes.

As expected, after the treatment, the skin bled for a short time (figure 2. B). When bleeding stopped, serous ooze formed and was removed from the surface of the skin with using sterile saline solution. At every follow-up, the same researcher evaluated the scars, scoring them using the same scale as previously, to assess any clinical improvement in the severity of the lesions.

The last follow-up was conducted one month after the second treatment then the photographs were compared with the photographs taken before the first treatment and each patient was given a new severity score

Figure 2 A. Before the first session of skin needling.

Figure 2 B. Immediately after the first session of skin needling show bleeding of the skin.

RESULTS

Table (3), Group A (12 patients) showed changes in scoring from (9 or 10) before skin needling to (4) in (4) patients, to (5) in (3) patients, to (6) in (4) patients and to (7) in one patient after skin needling, while apart from one patient all patients showed change in grading from (3) to (2).

Group B (8 patients) showed changes in scoring from (5 or 7) before skin needling to (2) in (4) patients, to (3) in (2) patients and to (4) in (2) patients after skin needling, while six patients showed change in grading from (2) to (1).

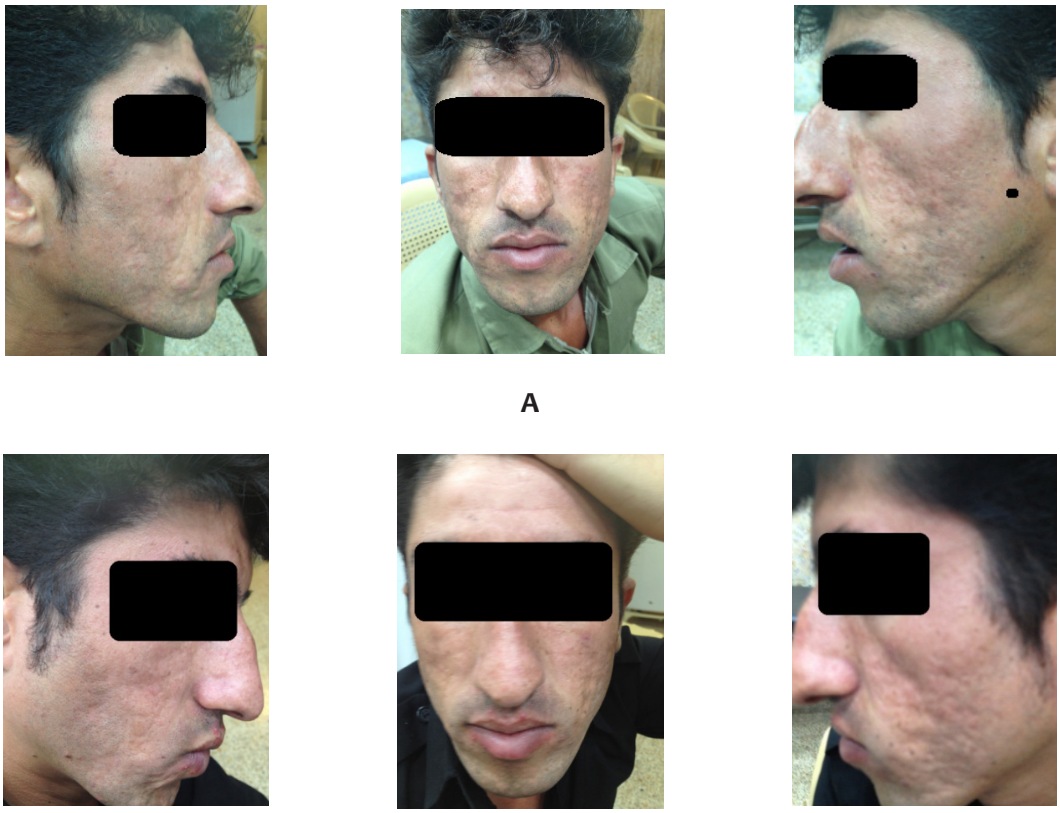
Group C (5 patients) showed changes in scoring from (4) before skin needling to (1) in (2) patients and to (2) in (3) patients after skin needling, while four patients showed change in grading from (2) to (1).

After two months and after two sessions of treatment the achieved results were assessed. Following each session of treatment, the facial skin appeared reddened and swollen, but the redness and swelling disappeared in 1–2 days with no side effects.

One month after the first session of skin needling; all patients had smoother facial skin and a slight reduction in lesion severity. One month after the second session of skin needling, the improvement in the acne rolling scars was evident as photographic comparison in each group of patients showed that the skin became thicker; and independent of the lesion grading. The relative rolling scar depth was significantly reduced (Figure 3, 4 and 5) and the patients were quite happy with the results.

Table 3. Scores and grading of patients before and after Skin Needling.

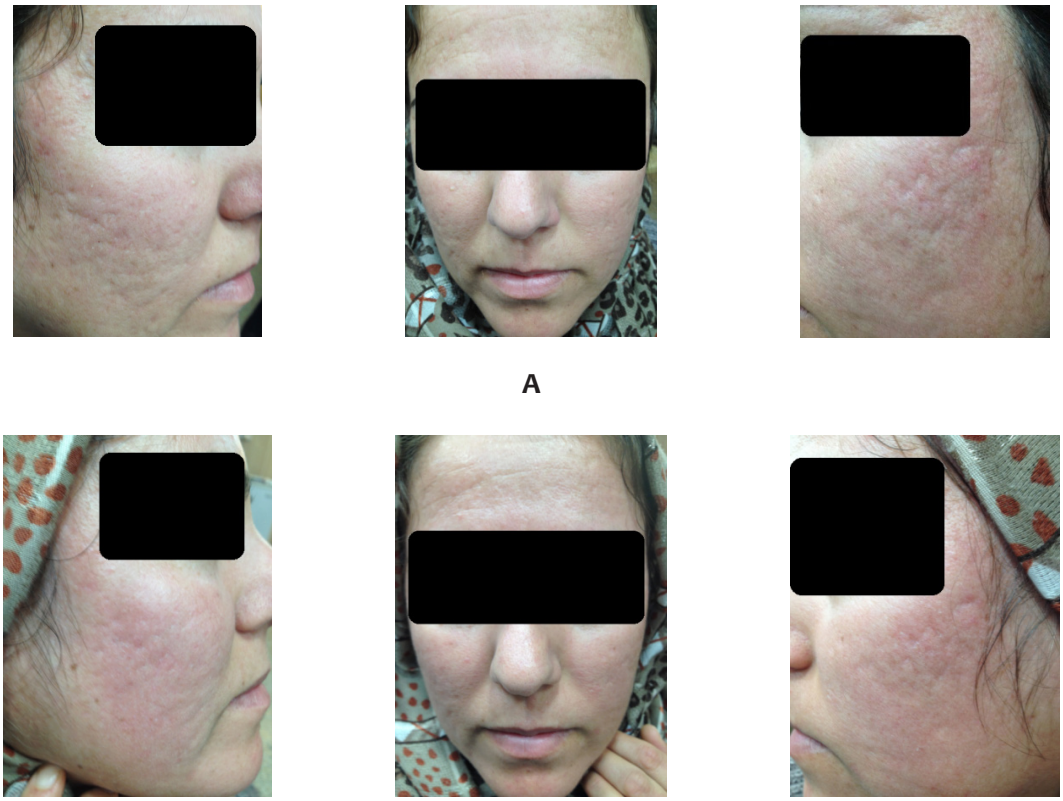
Group A (12 patients)				Group B (8 patients)				Group C (5 patients)			
Score Before Skin Needling	Score After 2nd Skin Needling	Grading Before Skin Needling	Grading After 2nd Skin Needling	Score Before Skin Needling	Score After 2nd Skin Needling	Grading Before Skin Needling	Grading After 2nd Skin Needling	Score Before Skin Needling	Score After 2nd Skin Needling	Grading Before Skin Needling	Grading After 2nd Skin Needling
10	4	3	2	7	3	2	2	4	2	2	1
10	4	3	2	7	2	2	1	4	1	2	1
10	5	3	2	7	4	2	2	4	2	2	1
9	5	3	2	5	2	2	1	4	1	2	1
10	6	3	2	7	4	2	1	4	2	2	2
9	4	3	2	7	3	2	1				
10	4	3	2	7	2	2	1				
10	6	3	2	7	2	2	1				
10	5	3	2								
10	6	3	2								
10	7	3	3								
10	6	3	2								



A

B

Figure 3. A. Before the treatment. B. Two months after the treatment.



A

B

Figure 4. A. Before the treatment. B. Two months after the treatment.

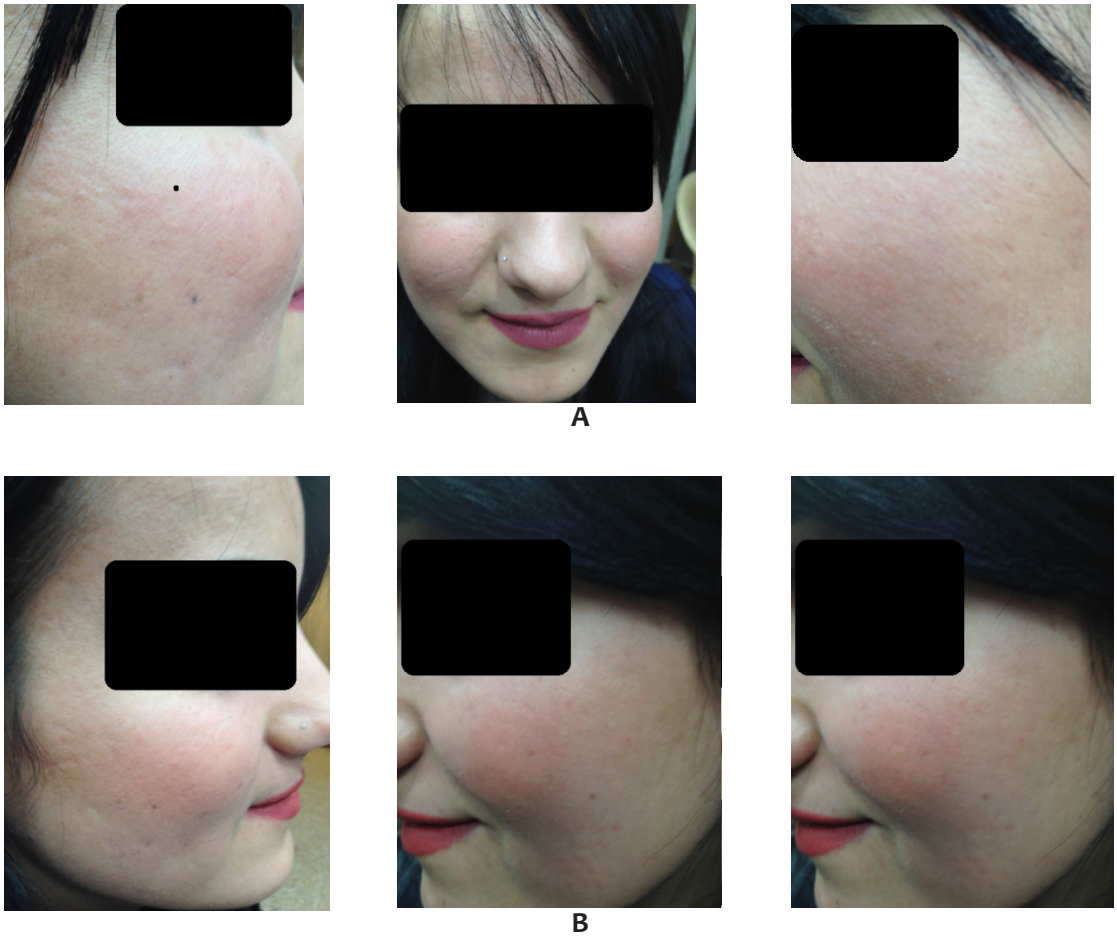


Figure 5. A. Before the treatment. B. Two months after the treatment.

Statistical Analysis

The average reduction value of each score or grading was calculated and they were negative values. According to the (t) test of the data in pairs, the averages of reductions were statistically analyzed using (0.01) as significant level ($P < 0.01$).

The obtained result, cleared that the average reduction (- 4.67) occurred in the score of the rolling scar by second skin needling in group (A) and it was highly significant, while the average change in the grading in this group was only (- 0.16), it was not significant.

The score and the grading of the rolling scar in group (B) were reduced by (- 4.0) and (- 0.75) respectively, and both were highly significant reductions.

The skin needling also affected significantly ($P < 0.01$) on the reducing both the score by (- 2.4) and the grading by (- 0.88) in group (C).

DISCUSSION

When needles penetrate into the skin, the injury causes localized damage and minor bleeding by rupturing fine blood vessels. A completely different picture emerges when thousands of fine needle pricks are placed close to each other. Most authors consider that skin needling induces normal wound healing [15].

There are certain advantages with skin needling therapy over laser resurfacing; skin needling does not lead to any epidermal injury as is seen with lasers. There is minimal downtime associated with the procedure unlike ablative laser resurfacing and the treatment is far cheaper as compared to lasers. Skin needling therapy is a recent addition to the other treatments for post-acne scars and can be performed in an office setting and does not need any extensive special training or expensive instruments [16].

In this study after two months and after two sessions of treatment good to excellent response was achieved in all patients and although only half of the patients have had changes in grading but all of them showed changes in severity scoring. Skin needling has definite advantages such as the cost is cheaper than other methods of treatment. The procedure is easy with its minimal downtime, and in addition adverse effects were absent.

Grade 4 atrophic facial scars did not respond to dermaroller treatment, however, these scars are difficult to treat even by other modalities such as lasers and may need surgical correction.

In conclusion, skin needling therapy is a simple, cheap, an office method and effective treatment for atrophic facial acne scars. Skin needling represents an important tool in the dermatosurgery in managing this common and challenging cosmetic problem.

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