ORIGINAL ARTICLE

A comparative evaluation of microneedling alone versus combined subcision and microneedling in post acne scars

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ABSTRACT

Various surgical procedures are available for management of acne scars and they can be combined with variable success. As microneedling targets superficial boxcar scar while subcision targets primarily rolling scars, it can be assumed that a combination of the two would give better results. Since no data available about the efficacy of microneedling alone vs microneedling with subcision in management of post acne scarring. So, in this study we aim to do so and to compare the efficacy of both procedures.

Material and Methods: A total of 40 patients with post acne scars were included in the study and were alternately recruited into two groups, Group-A (Microneedling) and Group-B. (Combined Microneedling and Subcision) and procedure were performed under sterile and similar atmosphere. Follow up was done at monthly intervals. The improvement were evaluated by both physician and patient.Appropriate statistics were use to analyze the results.

Results: Out of 40 patients age ranging from 18-44 years with a mean of 25.80 years, 37 patients completed the study. Majority (60%) were in the age of 20-30 years and the ratio (M:F) was equal. The mean number of rolling acne scars in Group-A decreased by 8.6% as compared to 27.9% in Group-B. There were significant statistical defferences. The mean number of icepick scars in Group-A decreased by 4.9% as compared to 18.25% in Group-B. The mean number of boxcar scars in Group-A decreased by 2.91% as compared to 18.32% in Group-B and statistically significant difference was achieved between baseline and 6th visit (p-.048). The mean number of total acne scars decreased by 4.83% and 19.65% respectively in group A & B over 6 months period. There was no statistical significant difference. No significant adverse effects were noted in any of the patients during the study period except postinflammatory hyperpigmentation in 1 patient.

The findings indicate that microneedling alone as well combination of microneedling with subcision produce good results in post acne scars and combination gives faster and superior results when compared to microneedling alone in treating rolling and boxcar scars.

INTRODUCTION

Post acne facial scarring is particularly devastating and is psychologically distressing.[1-3] The available treatments includes skin needling,[2] subcision, laser resurfacing, punch excision, punch elevation, chemical peels, microdermabrasion, dermal grafting, dermal fillers, fat transfer, implantation of autologous collagen and cultured and expanded autologous fibroblasts, focal treatment with tricholoroacetic acid (TCA).[2,4]

Subcision is a safe, effective technique and it releases fibrous attachments tethering the epidermis and dermis to the subcutis, which consequently leads to formation of connective tissue and augments the depressed site.[3,5]

Skin micro needling, is also an effective method

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which creates thousands of microclefts. Those tiny wounds in the papillary dermis create a confluent zone of superficial bleeding, a powerful stimulus to initiate the normal process of wound healing that promotes collagen deposition.

This procedure has been combined with other modalities of acne scar treatment like 100% TCA CROSS,[4] subcision,[5] chemical peels,[6] and with variable success.

Because microneedling targets superficial boxcar scar while subcision targets primarily rolling scars it can be assumed that a combination of the two would give better results.

No studies to evaluate the efficacy of microneedling alone vs microneedling with subcision in management of post acne scarring have been conducted up to now. The aim of this study was to compare the efficacy of microneedling alone vs microneedling with subcision in management of post acne scarring.

MATERIAL AND METHODS

Study Design and Patients

After ethical committee approval, a total of 40 patients with post acne scars were included. The inclusion criteria were patients with facial acne scars and the main exclusion criteria was who have undergone any skin resurfacing procedures within the preceding 1 year, on systemic retinoids or immunosuppressives drugs during or within 6 months, history of coagulation defects or bleeding diathesis, tendency to develop of keloid scars and with active acne lesions.

METHODS

The patients were alternately recruited into two groups, Group-A(Microneedling) and Group-B (Microneedling and Subcision).

A detailed demographic data, a thorough general physical and dermatological examination was carried out and recorded in preset proformas, to assess the number, distribution and type of post acne scars and they were scored based on ECCA (Ecchelle D' Evaluation Cliniques Des Cicatrices D'Acne). They were classified into icepick, boxcar and round types, were counted and recorded. Complete blood counts including platelet count, bleeding time and clotting time, serum reactivity for HIV, Hepatitis B and Hepatitis C antigen were done. After explanation of procedures a written and informed consent was taken.

Pre-treatment and post-treatment photographs were taken with Cannon Digital IXUS 255 HS (Pixels 12.1 MP, Focal length: 10x zoom: 4.3 (W) – 43.0 (T) mm, Aperture f/3.0, f/9.0 (W), f/6.9, f/20 (T)). The procedures were performed under aseptic conditions. Post procedures they were advised broad spectrum sunscreens and to avoid sun exposure.

Acne scars were recorded by using ECCA and self-devised quantitative grading for individual scars at baseline, 2nd visit, 4th visit, 6th visit. Improvements were recorded on VAS at each visit. Pre-Procedure photographs were taken at each visit.

Group-A (Microneedling)

Microneedling was performed after topical anesthesia (EMLA cream) by Dermaroller, a drum-shaped roller 20 mm wide, studded with 192 fine microneedles in 8 rows of 24 fine microneedles each with a diameter of 0.25 mm and needle length of 2.0 mm. in patients allocated to Group-A. The dermaroller was rolled over both sides of the face by rolling the device with some pressure, 4 times in 4 directions: horizontally, vertically, and diagonally right and left. The appearance of

uniform pinpoint bleeding was considered end point of the treatment.

Group-B (Microneedling and Subcision)

After a subcutaneous anesthesia the Nokor Admix 18G needles was inserted adjacent to a scar, parallel to the skin surface, just below the dermal-subcutaneous junction. The needle was advanced until resistance was felt. The needle was then gently swept across the site. An initial backward and forward motion was used to tunnel beneath the scar. After resistance started to decline, the needle was passed sideways in sweeping motion to complete the freeing up of the skin from the base. This action was repeated in a fan-like pattern to treat the entire scar and direct pressure were applied to prevent excessive bleeding. Once all the scars had been treated with subcision procedure, skin microneedling procedure was performed on both sides of face.

The subsequent sittings were only skin microneedling in both the groups at monthly intervals for another 3 sittings. They were followed up for another 2 months at monthly interval. The improvement in appearance of the patient of acne scarring was evaluated by both patient and physician on a 4 point visual analoge scale as follows : 1 for <25% improvement, 2 for 26-50% improvement, 3 for 51-75% improvement and 4 for >75% improvement.

STATISTICAL ANALYSIS

The statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, version 20.0 for Windows). Continuous data were given as mean ± SD, range or as median with interquartile range as appropriate. Normality of quantitative data was checked by measures of Kolmogorov Smirnov tests of normality. For comparison of outcomes pre and post intervention, paired-t test was applied. Analysis of Covariance with baseline attributes as covariate was used for testing difference among the groups. Wilcoxon signed rank test was used to compare non parametric data, pre and post intervention and Mann Whitney U test was used to compare the same among the two groups. All statistical tests were two-sided and performed at a significance level of p = 0.05.

RESULTS

Out of 40 patients age ranging from 18-44 years with a mean of 25.80 years, 37 patients completed the study. Three patients, one from group A and 2 from group B were lost to follow up. Majority (60%) were in the age of 20-30 years and the ratio (M:F) was equal. All of the patients were educated and the majority were graduate, 22 (55%), Most of the patients had acne scarring between the ages of 14-20 years, 26(65%). Disease duration varied from 1 to 25 years. Half of patients had duration <5 years.

Results of Post Acne scars Surgery:

Group-A (Microneedling)

The mean number of rolling type scars was 13.65 with SD of 14.67, icepick scar was 47.45 with SD of 23.536, boxcar scar was 30.20 with SD of 14.15 (Table 1).

Table 1 Comparison of mean scars at baseline in both the Groups

Type of scars	Group A Mean ± SD	GROUP B Mean	P Value
Rolling Scars	13.65±14.67	21.95	<0.001
Icepick Scars	47.45±23.536	79.65	<0.005
Box Scars	30.2 ±14.15	57.9	<0.005
Total Scars	91.3	153.5	<0.005

At the end of the study, the reduction in mean number of the individual scar types and their statistical analysis was as follows: (Table 2).

Table 2 Comparison of Baseline and 6th visit mean scar parameters in Group A (Microneedling)

Mean Scar parameters	At Baseline	At 6th Visit	P Value
Rolling Scars	13.65	12.47	0.031
Icepick Scars	47.45	45.11	0.019
Box Scars	30.2	29.32	0.03
Total Scars	91.3	82.35	0.04
ECCA	142.5	129	0.156

The mean of rolling scars decreased from 13.65 to 12.47, in icepick scars decreased from 47.45 to 45.11, and in boxcar scars decreased from 30.20 to 29.32. All were found to be statistically significant (p value of .031, .019 &.030 respectively).

The mean total scars decreased from 91.30 to 82.55 which was also statistically significant.(p -004).

The mean ECCA score decreased from 142.50 to 129, but no statistically significant difference was found in ECCA scoring (p - 0.156).

VISUAL ANALOGUE SCALE

According to the patients self analysis at the end of the study period, 5% reported marked improvement (50-75%), 74% had noticed moderate improvement (25-50%) and 21% patients had minimal improvement (<25%) (Table 3).

Table 3 Visual analogue scale after 5th visit in Group A

Visual Analogue Scale (VAS)			P Value
Percentage impromen	**Patient VAS**	**Physician VAS**	
Marked (50-75 %)	5%	0%	<0.005
Moderate (25-50%)	74%	84%	<0.005
Mild (<25%)	21%	16%	<0.005

Whereas, according to the similar analysis done by the physician, 84% had moderate improvement (25-50%) and 16% patients had minimal improvement (<25%) (Table 3).

The difference in visual analogue scoring of patients by both patient and physician was achieved a statistical significance from 3rd month onwards (p -.014 & .005) and was highly significant in 4th and 5th month (p < .001).

Group-B (Microneedling and Subcision)

Scarring profile of individual scar type and their statistical analysis was as follows. (Table 4).

Table 4 Comparison of Baseline & 6th visit scar parameters in Group B (Microneedling + Subcision)

Mean Scar parameters	At Baseline	At 6th Visit	P Value
Rolling Scars	21.95	15.83	0.001
Icepick Scars	79.65	65.11	0.011
Box Scars	57.9	42.39	0.001
Total Scars	153.5	111	0.002
ECCA	156.75	135.75	<0.005

The mean of rolling scars decreased from 21.95 to 15.83, in icepick scars decreased from 79.65 to 65.11, and in boxcar scars decreased from 51.90 to 42.39. All were found to be statistically significant (p value of <.001, .011 & .001 respectively).

The mean total scars decreased from 153.50 to 111which is also statistically significant. (p - .002).

The mean ECCA score decreased from 156.75 to 135.75.

Visual Analogue Scale - Fifty percent (50%) had marked improvement (50-75%), 44% had moderate improvement (25-50%) and 6% had minimal improvement (<25%) in their acne scars by patients (Table 5).

By the physician, 50% had marked (50-75%), 50% had moderate improvement (25-50%) in

their acne scars (Table 5).

The difference in visual analogue scoring of patients by both patient and physician achieved a statistical significance from 2nd month onwards (p - .014) and was highly significant in 3rd, 4th and 5th visits (p < .001).

Table 5 Visual analogue scale after 5th visit in Group B

Visual Analogue Scale (VAS)			P Value
Percentage improment	Patient VAS	Physician VAS	
Marked (50-75 %)	50%	50%	<0.005
Moderate (25-50%)	44%	50%	<0.005
Mild (<25%)	6%	0%	<0.005

COMPARING THE TWO GROUPS

The mean number of rolling acne scars in Group-A decreased by 8.6% over 6 months period as compared to 27.9% in Group-B. Statistical significant difference was achieved starting from 2nd visit of the (p - 0.016) and was highly significant in 4th and 6th visit (p - 0.001). The mean difference obtained with baseline as covariate in ANCOVA test, in the scars between the two groups was positive on 2nd, 4th and 6th visit. This can be inferred as Group-B having more reduction in number of scars as compared to Group-A (Table 6; Fig. 1 & 2)

Table 6 Comparison of mean reduction in various scars at 6th visit in both the Groups

Mean Percentage Scar reduction	Group A	Group B	P Value
Rolling Scars	8.6%	27.9%	<0.001
Icepick Scars	4.9%	18.25%	<0.005
Box Scars	2.91%	18.32%	<0.005
Total Scars	4.83%	19.65%	<0.005
ECCA	4.7%	3.7%	N.S

The mean number of icepick scars in Group-A decreased by 4.9% over 6 months period as compared to 18.25% in Group-B. Statistical significant difference was not achieved at anytime from baseline. (Table 6; Fig. 1 & 2)



Fig. 1 Pre Treatment Post Treatment



Fig. 2 Pre Treatment Post Treatment

The mean number of boxcar scars in Group-A decreased by 2.91% over 6 months period as compared to 18.32% in Group-B and was statistical significant difference achieved between baseline and 6th visit (p - .048). The mean difference was 4.868, implying that Group-B had more reduction in boxcar type of scar (Table 6; Fig. 1 & 2)

The mean number of total scars decreased by 4.83% and 19.65% respectively in group A & B over 6 months perios. There was no statistical significant difference (Table 6; Fig. 1 & 2)

The mean number ECCA score decreased by 4.7% & 3.7% respectively in group A & B over

6 months period. No statistical significant difference (Table 6; Fig. 1 & 2)

There was statistical difference on VAS by patients in two groups from 2nd visit onwards ($p < .05$). The mean percentage improvement was 61% in Group-B as compared to 46% in Group-A at 5th month (Table 7).

Table 7 Comparison of Visual analogue scale after 5th visit in both the groups

Mean Percentage improment in Visual Analogue Scale (VAS)			P Value
	Group A	Group B	
Patient VAS	46%	61%	<0.005
Physician VAS	46%	62.5%	<0.005

The physician difference in visual analogue scoring was statistically different, beginning with 3rd visit ($p < 0.05$). The mean percentage improvement was 62.5% in Group-B as compared to 46% in Group-A at 5th month (Table 7).

SIDE EFFECTS

Four patients in Group A and 3 patients in Group B developed post inflammatory hyperpigmentation during the treatment, but by the end of follow up period, only 1 patient had post inflammatory hyperpigmentation. No other significant adverse effects were noted in any of the patients during the study period.

DISCUSSION

A number of surgical modalities are being used, with varying success rates in various parts of the world in the treatment of postacne scarring. The different surgical modalities include subcision, skin microneedling, punch techniques, dermabrasion, microdermabrasion, chemical peeling, laser resurfacing, autologus fat transplant, dermal fillers etc. The different modalities are varyingly used either singly or in combination to achieve the desired cosmesis.

The mean age of patients was 25 years with a range of 18-44 years, with 60% of the patients in the age group of 21-30 years, which is similar with majority of other studies.[7,8]

The M:F ratio was equal in our study. This is in contrast to other studies, which have all shown a female preponderance.[3,7,9] The reason for this is probably socio-cultural, with males and females having equal access and awareness of the treatment.

All of the patients had both icepick and boxcar scars. In addition 30% of the patients had rolling scars. This is in accordance with other studies which have found either icepick or boxcar to be the commonest.[10,11]

We evaluated degree of improvement based on changes in scar count and ECCA score in each Group and in between groups and also based on visual analogue scale by patient and physician. However, in most of the studies in the literature, evaluation was not done based on scar subtypes, but rather on qualitative scales like Goodman and Baron qualitative scale.[12-17] Visual analogue scale,[3,18-21] or quantitative scales like Goodman and Baron quantitative scale,[22,23] or ECCA score.[6]

The results of group A were similar to various studies which evaluate the efficacy of microneedling for management of atrophic acne scars.[2,4,6,7,13,16,24-26] The following mentioned studies may not be directly comparable, as in each of these studies different treatment protocol and different measurement scales for improvement were used.

Fabbrocini et al.,[24] performed microneedling in 60 patients, which were divided into three groups

based on skin type. Total of 3 sittings were performed at monthly interval, and last assessment was performed 10 months after last sitting. Of the 45 patients with skin phototype III–V, majority had significant improvement by the end of study. Mean reduction of 31% was noted in the study.

Dogra S. et al[7] carried out microneedling for post acne scars on 36 patients and reported that 13.3% patients achieved marked improvement, 66.6% achieved moderate improvement and 20% had minimal improvement after 5 sittings.

A study by Leheta et al.,[4] in which microneedling was done on 30 patients, reported a mean improvement of 68.3% after a total of 4 treatment sessions at 4 weekly interval. Nearly half of the patients achieved significant improvement, 33.3% patient showed moderate improvement, 13.3% showed mild improvement.

Majid[16] performed miconeedling on 37 patients, for 4 sessions at monthly interval and reported good to excellent response in 88.7% patients. The study results showed that the severity of scars improved by two or more grade in 72.2% and 16.7% patients had improvement by single grade.

Shard J,[6] did microneedling alone on 30 patients and reported a mean improvement of 31.33% after 5 sessions of skin microneedling at 6 weekly interval.

A study by Fabbrocini et al,[2] in which skin microneedling was doneon 32 patients, reported a significant improvement in rolling type of acne scars, after 2 sessions at 8 weekly interval and assessment at 16 weeks.

In all the studies on microneedling, the results were consistent, and showed a moderate improvement in post acne scars. The number of treatment sessions varied between 2 to 5, interval between the treatment sessions varied from 4 weeks to 8 weeks. In our study, we did microneedling for a total of 4 sessions at 4 weekly interval and also achieved moderate improvement in acne scars at the end (41%) as evaluated by both patient and physcian. So, it is still unclear, whether more treatment sessions or shortening the duration between treatment sessions results in better outcome.

In Group-B, we performed a combination of skin microneedling and subcision. There is consensus among authors that combining different surgical modalities is the best approach in treating post acne scarring.[3,10,11,27-31]

As, there are no published literature which combine subcision and microneedling for the management of acne scars, however different authors have used various other modalities in addition to microneedling to improve the results.[6,8,12,15,32-34] The results of combining another modality which primarily targets a different type of scar has consistently shown combination to be better than single modality and subcision is the most useful treatment option for rolling scar.[10]

A study by Garg S et al.,[8] on 50 patients, subcision, dermaroller and 15% TCA peel were performed alternatively at 2-weeks interval for a total of 6 sessions of each. Grading of acne scar was done using Goodman and Baron qualitative scale. Out of 16 patients with Grade 4 scars, 10 (62.5%) patients improved to Grade 2 and 6 (37.5%) patients improved to Grade 3 scars. Out of 22 patients with Grade 3 scars, 5 (22.7%) patients were left with no scars, 2 (9.1%) patients improved to Grade 1and 15 (68.2%) patients improved to Grade 2. All 11 (100%) patients with Grade 2 scars were left with no scars. There was high level of patient satisfaction reported in the study.

Shard J.[6] compared microneedling and a combination of microneedling with 35% GA peel, on two

groups of 30 patients each and found the results of combination (62% clinical improvement) to be better than single treatment group (31% clinical improvement).

So, a combination of treatment approaches, gives a much better outcome, as can be seen from above studies. These results were also consistent with our combination approach which gave 61% and 62.5% improvement in VAS on patient and physician evaluation.

On comparing the two groups in our study, it was found that the combination of microneedling and subcision (Group-B) yielded superior results in both objective as well as subjective parameters.

So it is apparent from our results that the combination procedure was better at targeting rolling and boxcar type of scar when compared to single modality. Combination procedure had a single session of subcision as an extra treatment modality, and the difference in improvement can be attributed to the additional effect of subcision on releasing the subdermal fibrous tethering bands which are responsible for rolling type of acne scars. Our findings also, correlates well with data published in the literature[10,11,35,36] which have found subcision to be the primary treatment option for rolling type of acne scars.

The side effects noted in our study were also comparable to the adverse effects seen in other studies.[2,24]

Evaluation of results of a surgery is a difficult issue. Objective methods, such as comparative scar counting and quantitative scoring system are not in wide use in the published literature, only a few published studies use some form of objective scoring systems.[4,6,14,17,22,37-39] However most of the studies published on acne scar treatment have ranked the improvement in scales that translated the opinions of patients, authors, independent physicians.[3,19,37] This is a result of the difficulty in counting the innumerous lesions that can be present in acne scarred faces. Thus there is an urgent need of standardizing scarring scales in order to compare treatment results among different investigators.

The findings in our study indicate that microneedling alone as well combination of microneedling with subcision produce good results in patients with post acne scars and combination gives faster and superior results when compared to microneedling alone in treating rolling and boxcar scars. Combination of procedures also resulted in statistically better outcomes on both patient and physician evaluated visual analogue scale.

Therefore, in our opinion, subcision, which is a simple, safe, low cost treatment option can be added to another simple, safe and low cost treatment option i.e. microneedling to achieve greater results and need for more expensive and laborius procedures like laser skin resurfacing can be avoided.

However, in view of the paucity of studies regarding post acne scarring and the surgical modalities used for its treatment in Indian context, more studies on Indian patients, using larger sample size and more equitable distribution of patients are required to validate our results.

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