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Microneedling Vs Microneedling with PRP in Atrophic Acne Scars Treatment

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Abstract

Background: Acne scarring is the most common problem in acne patients causing cosmetic concern in acne patients attending dermatology OPD. Microneedling when combined with PRP has synergistic effect and offer a unique treatment approach with limited adverse effects and less down time. **Aims:** The aim of this study is to compare the efficacy of micro needling combined with PRP and microneedling alone in facial acne scars. **Methods:** A total of 60 patients were included in the study and randomly divided into two groups, Group A: 30 and Group B: 30. Proper counseling was done, and detailed clinical findings were recorded. Patients in Group A were treated with dermaroller alone while Group B patients underwent treatment with a combination of dermaroller and intradermal PRP injections. A total of four sittings were done at monthly interval. Final response was assessed at 1 month after the last sitting. Criteria of evaluation included Goodman and Baron's quantitative scale, visual analogue score, and dermatology life quality index scores. Side effects were noted. Results were analyzed using Chi-square test and *t*-test. **Results:** Significant percentage improvement was noted in both the groups. However, Group B treated with both modalities had better results when compared with that in the Group A. **Conclusion:** A combination approach using dermaroller and PRP was a safe and better option than using dermaroller alone in atrophic acne scars for clinical improvement as well as for improvement in dermatology life quality index score.

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Introduction

Acne vulgaris is a common dermatological problem among adolescents and often it leads to atrophic scars.[1],[2],[3] Layton *et al*. reported that facial scarring affects both sexes equally and occurs in 90% of patients with acne.[4] Severe post acne scarring has been implicated as a cause of considerable psychological distress, mainly among adolescents.[5],[6],[7] Although many treatment options are available, platelet-rich plasma (PRP) is one of the promising therapies for acne scars. PRP has been a long-known tool in esthetic medicine[8],[9],[10],[11],[12]. The present study compared the efficacy of the combination of microneedling with PRP versus microneedling alone in patients with atrophic acne scars.

Methods

After taking clearance from institutional Ethics Committee, 60 patients with acne scars attending the outpatient department were enrolled in the study. The duration of study was 1 year (january 2022 to january 2023). The inclusion criteria include all patients presenting

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

with Goodman and Baron's Grade 2, 3, 4 acne. The exclusion criteria included presence of active acne lesions, patients having keloid scarring or keloidal tendency, history of bleeding disorder and anticoagulant therapy, oral steroid therapy, active skin infections like warts,herpes and bacterial infection, pregnancy and lactation. A proper informed consent was taken and baseline investigations were done. Patients were randomly divided into two Groups: Group A was treated with dermaroller alone while Group B was subjected to a combination therapy of dermaroller and PRP. The patients are thoroughly evaluated and grading of the acne scars is done using Goodman and Baron Scale. They will be explained about the microneedling, PRP therapy and vitamin C application. Patients will also be explained about the cost factor involved, benefits, duration, possible side effects and prognosis of the treatment. An informed consent will be obtained. Complete blood count including platelet count will be done. Digital photographs of both sides of face wiil be taken. The area of interest is anesthetized using a thick application of topical anesthetic cream (EMLA) for about 30-45 minutes before the procedure. For preparation of PRP, 10 ml of autologous whole blood is collected into tubes containing acid citrate dextrose (ACD) and centrifuged at 1500 rpm for 10 minutes in order to get PRP at the top of the test tube. Then, the PRP is further centrifuged at 3700 rpm for 10 minutes at room temperature of 22°C in order to obtain a platelet count 4.5 times higher than the base line (i.e., 8-9 lakhs/µl). Platelet-poor plasma (PPP) is partly removed and partly used to resuspend the platelets. Calcium gluconate is added as an activator (1:9), i.e., 1 ml of calcium gluconate in 9 ml of PRP. Micro needles with 1.5 mm length and 192 needles on roller drum were used . The skin is stretched and microneedling was carried out in vertical, horizontal and both diagonal directions for about 4-5 times. PRP (2 ml; platelet concentration: 8-9 lakhs/µl) and vitamin C (2 ml; 15%) were applied to the group A and group B respectively. The procedure was repeated 4-5 times in the above-said directions. Ice packs were applied over the treated areas. The subjects were instructed to follow strict photo-protective measures. The patients were reviewed after 1 week for any side effects. A total of four similar sittings were done at intervals of 4 weeks each. At the end of four treatments, the scars are graded using grading system as used in the beginning. Photographs of both sides of the face will be taken under consistent background, position and lighting and compared with the pre-treatment images. The improvement is rated as poor, good and excellent depending upon the change in grade of acne scars by both treating physician and the patient. An improvement by two grades is considered as excellent, 1 grade is rated as good and no up gradation on assessment is labelled as poor response. Any adverse effect that occurred due to the treatment is noted down. Post procedure, antibiotic medication for 2-3 days, sun protection and regular usage of sunscreens is advised.

Acne scars were classified on the basis of Goodman and Baron's quantitative global acne scar grading system.[13] Scar type, degree of scarring, and number of lesions on both sides of the face were noted. Visual analog score (VAS) was interpreted based on a questionnaire given to the patients where they had to rate their improvement on a 0–10 scale. Score of 0 was taken as "No response," 1–3 as "Poor response," 4–5 as "Fair response," 6–7 as "Good response," and 8–10 as "Excellent response." Furthermore, dermatology life quality index (DLQI)[14] score was tabulated.

All the scores were calculated at baseline and at 1 month after the final session. Under adequate illumination, clinical photographs of the full face and both sides of the face were taken before each session and at follow-up.

After collecting the information, data were compiled, tabulated, and analyzed with respect to mean, standard deviation, and percentage. Chi-square test and *t*-test were applied. $P<0.05$ was considered statistically significant.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

Results

In the beginning of study GROUP A and GROUP B had 30 patients each their dermographic profile is tabulated in table1. Out of 60 patients 5 patients did not complete the study. Two from group A and one from group B were lost to follow up. One from each group were drop outs. There were 28 males and 27 females with mean age of 25.66+/-2.5. Of the Fitzpatrick skin types , 32 patients (58.18%) belonged to Type IV followed by 20 (36.36%) in Type V and 6 (5.45%) to Type III. The most common scar type noted was a combination of ice pick, and boxcar, in 30 patients (54.54%) followed by combination of ice pick, boxcar and rolling scars in 17 (30.90%), boxcar and rolling scars in 3 (5.45%), ice pick and rolling scars in 2 (3.63%), and rolling scars in 3 (5.45%). Family history of scarring was positive in 19 patients (34.54%) and negative in the remaining (65.45%). Demographic data are summarized in [Table 1].

Table 1: Demographic data

Clinical profile	Group A	Group B
GENDER		
Male	15(55.6%)	13(46.4%)
Female	12(44.4%)	15(53.6%)
AGE GROUP		
<18 year	1(4%)	0(0)
18 to 24 years	8(29.6%)	7(25%)
25 to 30 years	17(62.35)	20(71%)
>30 years	1(4%)	1(3.5%)
FAMILY HISTORY		
Yes	10(37%)	9(32.1%)
No	17(62.9%)	19(67.9%)
SKIN TYPE		
I		
II		
III	2(7.4%)	1(3.6%)
IV	15(55.6%)	17(60%)
V	10(37%)	10(35.7%)
VI		
SCAR TYPE		
Ice pick + box car + rolling	8(29.6%)	9(32.1%)
Ice pick + box	14(51.8%)	16(57.1%)
Box + rolling	2(7.4%)	1(3.5%)
Ice pick + rolling	2(7.4%)	0(0)
Rolling	1(3.7%)	2(7.1%)

Table 2: Goodman and Baron's quantitative scores at baseline and after treatment

	Group A (mean +SD)	Group B (Mean + SD)	T – score P
At baseline	43.81+8.09	43.14+12.8	5.85. <0.05
At 1 month after	29.92+4.03	24.21+5.80	6.96. <0.05
The fourth session	36.43	31.02	
Paired t test.	P<0.01	P<0.01	

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

Figure 1: Microneedling alone

Figure 2: Microneedling alone

Figure 3: Microneedling and PRP combination therapy

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

Figure 4: Microneedling and PRP combination therapy

On visual analogue score, there was greater improvement in Group B after the treatment indicating greater patient satisfaction in the group treated with the combination therapy [Table 3].

Table 3: Visual analogue score at baseline and after treatment

Visual analog score	Group A	Group B	t score p
After 1st session	***1.27+0.62***	**2.32+0.69**	**t=5.929 ;. P<0.05**
After 2nd session	***2.96+1.03***	**4.67+0.98**	**t=6.309 ; p<0.05**
After 3rd session	***4.31+1.12***	**7.43+1.34**	**t=9.351 ; p<0.05**
Paired t – test	***t=-7.304***	**t=-10.374**	
(1st - 2nd session)	***P<0.01***	**P<0.01**	
Paired t – test	***t=-4.610***	**t=-8.797**	
(2nd – 3rd session)	***P<0.01***	**P<0.01**	

On tabulating DLQI scores, baseline figures of both the groups indicated that acne scars had very large to extremely large effect on patients' quality of life. After treatment, a statistically significant difference was noted between the two Groups. There was improvement in QoL in Group B and in Group A [Table 4].

Table 4: Dermatology life quality index scores at basline and after treatment

Dermatology life Quality index	Group A	Group B	t- score p
At baseline	16.32+0.61	15.92+0.76	2.148. <0.05
1 month after 3rd session	9.62+0.69	6.32+0.79	13.979. <0.0001

Few side effects were noted. Erythema (16.25%), edema (22.63%), and hyperpigmentation (8.32%) were the side effects reported. There was no statistically significant difference in the occurrence of side effects between the two groups.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

Figure 5: Side effects: Erythema on cheeks.

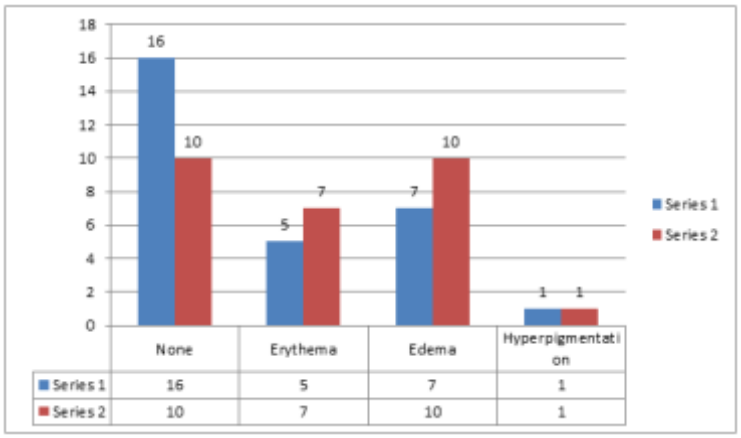

Figure 1

Discussion

Treatment of acne scars often involves a concoction of approaches. With the advent of microneedling and PRP therapy for atrophic scars, new avenues for treatment of acne scars can be explored. Microneedling, which is done using dermaroller, is an efficacious procedure with less side effects. This procedure, in addition to collagen induction, creates minute inlets for effective absorption of topical agents.[15] PRP serves as rich source of autologous growth factors, especially epidermal growth factor, platelet-derived growth factor, transforming growth factor beta, and vascular endothelial growth factor, that act in coherence with growth factors induced by skin needling, to enhance the wound-healing response.[16],[17] In a split face study by Fabbrocini et al., severity score analysis showed that acne scars on the right side of patients' faces, treated with skin needling in combination with PRP application, had higher improvement than the ones on the left side, treated with skin needling alone.[15] Nofal et al. studied 45 patients with acne scars and reported that patients treated with a combination of skin needling and PRP showed statistically highly significant improvement in the degree of acne scars.[18]

In our study males out numbered females (50.90:49.10.); Goulden et al. also observed scarring more in male in their study.[19] Mean age of patients was 28.34 years in our study sample and maximum numbers (67.3%) were between the age group of 25–30 years of age. Majid observed age of the patients ranged from 13 to 34 years, with the mean age of 22.4 years.[20] We observed most of our patients were suffering from combination of ice pick and boxcar scars (47.27%) followed by a combination of ice pick,box and rolling scars. Jacob et al. observed that ice pick type represents 60%–70% of total scars, the box scars 20%–30%,

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

and rolling scars 15%–25%.[21] We had used Goodman and Baron's quantitative acne scar grading system[13] of classification for acne scars. The grading system was based on lesion counting (1 point for a number of lesions <10, 2 points between 11 and 20, and 3 points >20) and severity (1 point for mild atrophic scarring, 2 points for moderate atrophic scarring, 3 points for severe atrophic scarring, and 4 points for hyperplastic scarring). The lesion counting score was then multiplied for the lesion severity score. The final score depended on the addition of points assigned to each respective category and reflected disease severity, ranging from a minimum of 0 to a maximum of 84. Although complicated, it helped us in objective assessment in a systematic way. In a study by Chandrashekar et al., quantitative assessment using Goodman and Baron's score showed moderate improvement in 58% of the patients, minimal in 29%, good improvement in 9%, and very good improvement in 3% of the patients.[22] Our study showed 46.5% improvement among Group B and 32.5% improvement among Group A patients using this scoring system. Furthermore, the change in the QoL of patients after taking treatment had been assessed in the study using DLQI.[14] The questionnaire was designed for use in adults, i. e., patients over the age of 16. It was self-explanatory and could be simply handed to the patient who was asked to fill it in without the need for detailed explanation. It was usually completed in 1 to 2 min. The score was calculated by summing the score of each question resulting in a maximum of 30 and a minimum of 0. The higher the score, the more QoL was impaired.

Meaning of DLQI Scores:

I. 0–1 = No effect at all on patient's life
II. 2–5 = Small effect on patient's life
III. 6–10 = Moderate effect on patient's life
IV. 11–20 = Very large effect on patient's life
V. 21–30 = Extremely large effect on patient's life.

The DLQI scores clearly indicated that both the groups were benefitted in terms of improvement in quality of their life. However, the patients treated with both dermaroller and PRP had statistically significant results. Hayashi et al. observed acne scars in 90.8% cases and opined that acne scars had a negative impact on patient's QoL.[23] In an Indian study conducted by Hazarika and Rajaprabha, 13 out of 29 cases with severe acne scars had DLQI scores, interpreted as very large effect.[24]

The side effects noted were few and there was not much difference between the two groups in occurrence of side effects. Erythema and edema occured after the procedure and persisted for 3-4 days while patients reported hyperpigmentation at 2-3 weeks after the sitting. In the study by Garg and Baveja, three patients (6%) developed postinflammatory hyperpigmentation.[25]

Conclusion

Microneedling provided good results, and the addition of PRP enhanced the outcome in patients with atrophic acne scars physically and mentally. Though invasive procedure its cost effective when compared to lasers and with satisfactory results.

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ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

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