Efficacy of autologous platelet-rich plasma combined with microdermabrasion compared with platelet-rich plasma alone on postacne scars

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Background
Acne is an inflammatory disorder of the pilosebaceous units. The severity of acne scarring depends on delays in treating acne patients.

Objective
To assess the effect of platelet-rich plasma (PRP) in cases of postacne scar and compare the effect of PRP alone and in combination with microdermabrasion on postacne scars.

Patients and methods
Twenty adult facial postacne scar patients were enrolled. Goodman and Baron's scale and ECCA scale were used to determine the severity of acne scars. PRP was injected after microdermabrasion on the right side of the face, while PRP was injected alone on the left side of the face. This was done regularly each month for three sessions. Evaluation of improvement was assessed by Goodman and Baron qualitative scale and ECCA scale for each patient both at the baseline and 1 month after the last session, along with photography.

Results
There was an increase in the scar outcome in the side treated with combined therapy, but it did not reach a significant level between both sides of the face by all objective methods of assessment.

Conclusions
PRP alone or in combination with microdermabrasion is an effective modality for the treatment of postacne scars.

Keywords:
platelet-rich plasma, postacne scars, therapy

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Introduction

Acne is an inflammatory disorder of pilosebaceous units and is common during adolescence. The characteristic lesions of acne are comedones, papules, pustules, nodules, and cysts. It may lead to scarring and pigmentation [1].

The severity of acne scarring may depend on the delay in treating acne patients [2]. Acne scars are classified into: atrophic, hypertrophic, or keloidal [3]. Atrophic acne scars are further classified into ice pick, rolling, and boxcar [4].

The aim of scar treatment is to give the skin a more acceptable physical appearance [5,6]. For best results, a combination of techniques may be required [7].

Platelet-rich plasma (PRP) is an autologous preparation of platelets in the concentrated plasma and has been used in mesotherapy for skin rejuvenation [8], scars, hair loss, burns, and ulcers. It is an adjunct treatment for wrinkles and photodamaged skin [9].

The α-granules of concentrated platelets secrete many growth factors. These factors control cell migration, attachment, proliferation, cell differentiation, and improve the production of extracellular matrix protein [10].

Microdermabrasion is a minimally invasive procedure which causes mechanical removal of the superficial epidermis and stimulates the growth of new cells [11]. Microdermabrasion may improve acne scars, acne, and mottled pigmentation [12–14].

Aim

In the current study, we assessed the effect of PRP on acne scars and compared the effect of PRP alone

and in combination with microdermabrasion on acne scars.

Patients and methods

Study design

A comparative hospital-based study was done at the Department of Dermatology, Venereology and Andrology jointly with the Clinical Pathology Department of Assiut University Hospital, Egypt.

Patients

Twenty adult patients with facial acne scars (age range, 19–32 years; eight men and 12 women) with Fitzpatrick skin types ranging from types III to V were included in this study. The exclusion criteria: pregnant women, patients with acne rosacea, chronic liver disease, autoimmune diseases, blood disorders, recurrent herpes infections, and patients using systemic chemotherapy, anticoagulation therapy, and antiplatelet agents. Full history was taken from all patients. Dermatological examination included clinical evaluation and photography. Clinical evaluation included the skin phototype and determination of the number and the type of acne scar. All patients were evaluated before treatment and 1 month after the last session.

Methodology

PRP preparation technique (as described before) [15]: briefly, 10 ml of blood was collected with sodium citrate as an anticoagulant at a concentration of 10: 1 and was processed by two centrifugation steps. The first centrifugation step at 160 g for 10 min and the second centrifugation step at 400 g for 10 min. Only the 'buffy coat' layer was collected [16]. We added 1 ml of 3% calcium chloride to PRP to enhance platelet activation.

Microdermabrasion

It was done using Reviderm skin peeler professional (Germany).

Treatment regimen

All patients were instructed to avoid NSAIDs for 10 days before the session and sun exposure at least 24 h before the session.

Procedure

We applied a topical anesthetic cream to the face and left it for 30 min and then removed through washing the face. Then disinfection with alcohol 70% was done. Three passes with microdermabrasion handpiece were performed to the right side of the face. Then the entire face was injected intradermally using an insulin syringe with 1 ml PRP on each side of the face.

Patients were instructed to avoid washing the face for 24 h after the treatment, apply topical antibiotic cream twice daily for 5 days, and a broad-spectrum sunscreen every morning. This treatment was done for three sessions 1 month apart.

Assessment of the response to the treatment

All patients were evaluated by photographic documentation at baseline and at 1 month after the last session. Qualitative assessment was conducted using Goodman and Barron qualitative system which has four grades: macular, mild, moderate, and severe [17]. If the severity was reduced by two grades and if the change in the grade of acne scarring was reduced by two grades, the improvement was considered excellent; if the reduction was by one grade, it was considered as good; and if there was no reduction, the improvement was considered poor [18].

The ECCA scale (echelle d'evaluation clinique des cicatrices d'acné) [19] was used for initial evaluation for all patients to detect the type of acne scars and their numerical extent and the severity of acne scarring and at the end of the sessions.

Two dermatologists who were blinded to the treatment evaluated the serial photographs in a randomized manner (before and after treatment, without labeling) to determine whether discernible clinical improvement had occurred. Evaluators used a quartile grading scale of excellent (>75–100%), marked (>50–75%), moderate (>25–50%), and slight improvement (0–25%) [20].

Patients were asked to rate their satisfaction with the sessions by the quartile grading system [21] and report any cutaneous adverse effects including oozing, erythema, scarring, dyschromia, and secondary infection in the posttreatment period.

Statistical analysis

Data entry and data analysis were done using Statistical Package for the Social Sciences, version 19, IBM Corp, Armonk, NY, USA). χ^2, Fisher's exact, Mann–Whitney, and Wilcoxon signed-rank tests were used. Spearman's correlation was done. *P* value was considered statistically significant when *P* value less than 0.05.

Ethical consideration

Review of the proposal was done before starting data collection via the Ethics Committee Faculty of Medicine.

Privacy and confidentiality of all the information was assured.

The aim of the study was explained to each participant before the treatment.

Informed consent was obtained from those who welcome to participate in the study.

Results

Descriptive data of the studied patients

The present study enrolled 20 patients with facial acne scars. The mean age of the patients was 24.40 ± 3.95. Twelve patients were women and eight patients were men. Seven patients had skin phototype III; 12 patients had type IV while type V was present in one patient. The scar duration of the patients ranged from 3 to 15 years.

According to the qualitative grading system proposed by Goodman and Baron [17], out of 20 patients, five patients had grade 4, 13 patients had grade 3, and two patients had grade 1 on both sides of the face while grade 2 was not detected in our patients.

According to the ECCA scale, most patients showed mixed type of scars (ice pick, boxcar, and rolling).

Photo evaluation

The percentage of excellent and marked improvement was higher in the group treated with both microdermabrasion and intradermal injection of PRP compared with the group treated with PRP alone.

Goodman and Baron qualitative scale evaluation

The percentage of excellent and good improvement was higher in the group treated with both microdermabrasion and intradermal injection of PRP compared with the group treated with PRP alone.

ECCA evaluation

There was a statistically significant decrease in the total number of scars on both sides of the face after the sessions than before using the quantitative ECCA scale.

Patient satisfaction

In terms of the degree of patient's satisfaction on the side treated with microdermabrasion and PRP, 30% of the patients were very satisfied, 40% were satisfied, 20% were slightly satisfied; and only 10% were unsatisfied. As for the left side treated with PRP, 10% of the patients were very satisfied, 50% were satisfied, 25% were slightly satisfied, and only 15% were unsatisfied.

Safety assessment

Pain on both sides of the face was reported in all patients of the study. It was noticed only during the procedure and was quite tolerable. Only 40% of the patients showed adverse effects in the form of mild erythema and edema on both sides of the face for only 2 days (Tables 1–3 and Figs 1–4).

Discussion

Acne is a multifactorial chronic inflammatory disease of the pilosebaceous unit. It mainly occurs during adolescence [22,23]. Unfortunately, acne scarring is common. It is considered one of the most common causes of facial scarring [24].

In our study, we analyzed the efficacy of intradermal injection of PRP and microdermabrasion (MDA) on the right side of the face versus PRP alone on the

Table 1 Photo evaluation by quartile scale

Quartile scale	Right (microdermabrasion+PRP) (*n*=20) [*n* (%)]	Left (PRP) (*n*=20) [*n* (%)]	*P*
Excellent	3 (15.0)	1 (5.0)	0.605
Marked	6 (30.0)	5 (25.0)	0.723
Moderate	5 (25.0)	8 (40.0)	0.311
Slight	6 (30.0)	6 (30.0)	1.000

PRP, platelet-rich plasma.

Table 2 Comparison between the degree of improvement of acne scar with Goodman and Baron on both sides of the face

Improvement	Right (microdermabrasion+PRP) (*n*=20) [*n* (%)]	Left (PRP) (*n*=20) [*n* (%)]	*P*
Excellent	2 (10.0)	0	0.487
Good	15 (75.0)	14 (70.0)	0.723
Poor	3 (15.0)	6 (30.0)	0.451

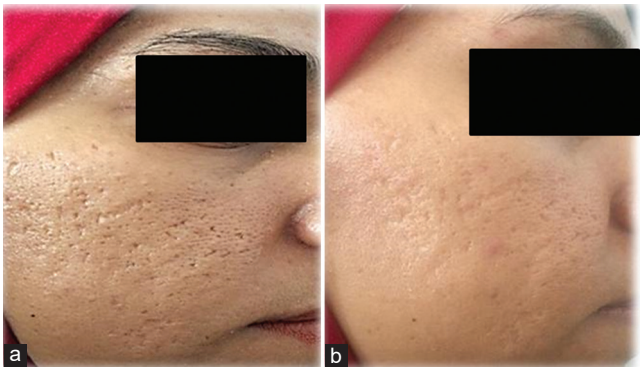
PRP, platelet-rich plasma.

Table 3 ECCA grading scale on the right and left sides of the face

Total	Right (microdermabrasion+PRP) (*n*=20)	Left (PRP) (*n*=20)	*P*[a]
Before			
Mean±SD	95.00±32.20	85.25±29.58	0.342
Median (range)	95.0 (30.0-180.0)	90.0 (30.0-145.0)	
After			
Mean±SD	66.50±28.75	69.00±31.90	0.838
Median (range)	70.0 (0.0-120.0)	72.5 (0.0-135.0)	
P[b]	0.001	0.003	

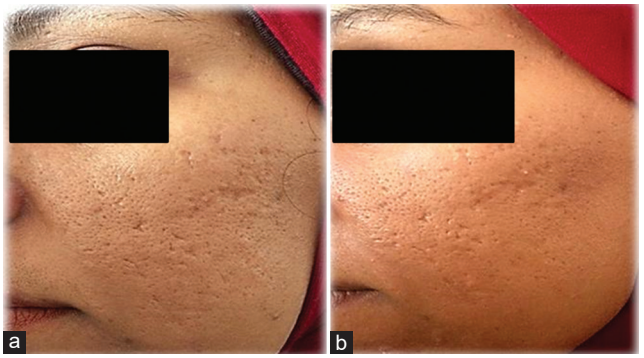
PRP, platelet-rich plasma. [a]*P* value, *P* value between the right and left sides of the face. [b]*P* value, *P* value between the effect before and after treatment.

Figure 1



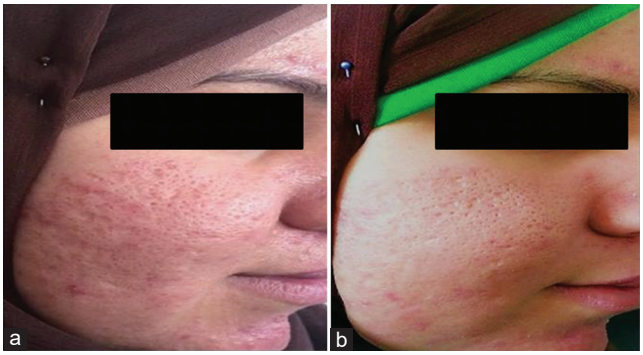
Female patient with moderate acne scars showed good response on the right side of the face (treated with microdermabrasion and platelet-rich plasma) (a) Before treatment (b) After treatment with platelet-rich plasma

Figure 2



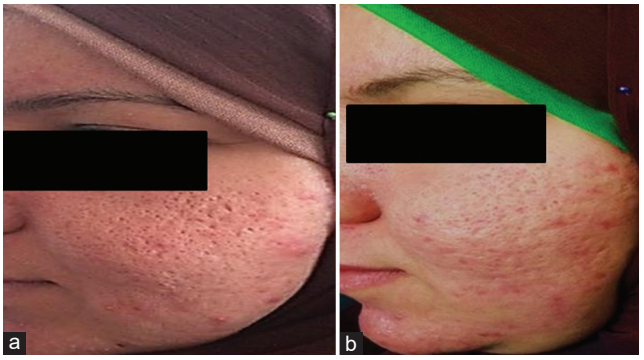
The same patient of Figure 1 showed poor response on the left side of the face (treated with platelet-rich plasma). (a) Before treatment (b) After treatment with platelet-rich plasma

Figure 3



Female patient with severe acne scars showed excellent response on the right side of the face (treated with microdermabrasion and platelet-rich plasma). (a) Before treatment (b) After treatment with microdermabrasion and platelet-rich plasma

Figure 4



The same patient of Figure 3 showed good response on the left side of the face (treated with platelet-rich plasma). (a) Before treatment (b After treatment with platelet-rich plasma

left side of the face in acne scars in 20 patients for 3 monthly sessions. The evaluation of improvement was assessed by the Goodman and Baron qualitative scale and ECCA scale for each patient at the baseline and 1 month after the last session, along with photography.

To the best of our knowledge, this is the first study to assess the combination of MDA and PRP in the treatment of facial acne scars.

Regarding the use of PRP alone in the treatment of acne scar treatment, many authors reported that acne scars have been significantly reduced in the majority of patients after PRP injection [6,25], which is in agreement with our study.

On evaluating the photos using the quartile scale, out of the 20 patients treated by PRP injection alone in the present study, one patient showed excellent improvement, five patients showed marked improvement, eight patients showed moderate improvement, and six patients showed slight response.

Estimation of improvement in scar morphology with the Goodman and Baron qualitative scale in the present study showed that out of 20 patients treated by PRP injection alone, 70% achieved a reduction in the grade of their scarring by one grade while 30% showed poor response. Five patients with grade 4 showed good response. In 13 patients with grade 3 scarring, a good response was seen in 35% of patients and 30% achieved a poor response. The two patients with grade 1 scars showed a good response to treatment with complete disappearance of lesions.

Gómez and Romero [26] studied the PRP effect in the treatment of acne and acne scars. They showed that grade 1 erythematous lesions in the face completely disappeared.

Regarding ECCA evaluation of our patients treated by PRP injection, there was a statistically significant decrease in the total number of scars. There was a statistically significant decrease in rolling acne scars which is consistent with the study of Elkahky *et al.* [27]. In our study, there was insignificant decrease in boxcar and ice pick acne scars.

Regarding the patient satisfaction in the present study, 17 patients showed different degrees of satisfaction by PRP injection (two patients were very satisfied, 10 patients were satisfied, and five patients were slightly satisfied) and only three patients were unsatisfied.

As regards MDA in the treatment of acne scars, Tsai *et al.* [5] first reported the efficacy of MDA for treating acne scars. They observed good to excellent results in all patients.

Arora [28] studied the efficacy of microdermabrasion in facial acne scars in 25 patients with acne scars. Of the 25 patients who had moderate scarring, 84% showed good response, 12% showed fair response, and 4% showed excellent response.

Regarding combined therapy, most of the previous studies had combined PRP with conventional treatment other than microdermabrasion with promising results as the study done by Shw and Murlistyarini [15], which studied the effect of a combination of skin needling, PRP, and glycolic acid 70% chemical peeling for atrophic acne scars.

In the present study, regarding the photo evaluation according to the quartile grading scale among the 20 patients treated by microdermabrasion and PRP injection: three patients showed excellent improvement, six patients showed marked improvement, five patients showed moderate improvement, and six patients showed slight response.

By using the Goodman and Baron scale in the evaluation of our patients: out of the 20 patients treated by MDA and PRP injection, 17 patients achieved good to excellent response. Out of the five patients with grade 4 scarring, only one patient showed excellent response and four patients showed good response. In 13 patients with grade 3 scarring, an excellent response was seen in one patient, good response was seen in nine patients, and three patients achieved a poor response to treatment. The two patients with grade 1 scars showed a good response to treatment with complete disappearance of the lesions.

Regarding ECCA evaluation of our patients treated by MDA and PRP injection, there was a statistically significant decrease in the total number of scars. Also, there was a statistically significant decrease in all types of acne scars (rolling, boxcar, and ice pick acne scars).

On comparing the two modalities of treatment used in the present study, there was an increase in the scar outcome in the side treated with combined therapy, but it did not reach a significant level.

The higher response of combined PRP and MDA in acne scar treatment may be explained by the synergy of the mechanical disruption of the stratum corneum by MDA with activated platelets, which modify the process of natural healing response by releasing cytokines and growth factors. These factors enhance remodeling of acne scars.

Conclusion

PRP alone or in combination with microdermabrasion is an effective modality for the treatment of acne scars. Microdermabrasion combined with PRP is markedly effective in the treatment of all types of scars (rolling, boxcar, and ice pick) while PRP alone is markedly effective only for the treatment of rolling scars.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 James W. Acne. N Engl J Med 2005; 352:1463–1472.

2 Goulden V, Layton A, Cunliffe W. Long-term safety of isotretinoin as a treatment for acne vulgaris. Br J Dermatol 1994; 131:360–363.

3 Goodman G, Baron J. The management of postacne scarring. Dermatol Surg 2007; 33:1175–1188.

4 Jacob C, Dover J, Kaminer M. Acne scarring: a classification system and review of treatment options. J Am Acad Dermatol 2001; 45:109–117.

5 Tsai R, Wang C, Chan H. Aluminum oxide crystal microdermabrasion. Dermatol Surg 1995; 21:539–542.

6 Redaelli A. Face and neck revitalization with Platelet-rich plasma (PRP): clinical outcome in a series of 23 consecutively treated patients: (original articles) (clinical report). J Drugs Dermatol 2010; 9:466–472.

7 Thiboutot D, Gollnick H, Bettoli V, Dreno B, Kang S, Leyden J, *et al.* New insights into the management of acne: an update from the Global Alliance to Improve Outcomes in Acne group. J Am Acad Dermatol 2009; 60:1–50.

8 Lee J, Kim B, Kim M, Mun S. The efficacy of autologous platelet rich plasma combined with ablative carbon dioxide fractional resurfacing for acne scars: a simultaneous split‐face trial. Dermatol Surg 2011; 37:931–938.

9 Kumaran M. Platelet-rich plasma in dermatology: boon or a bane?. Indian J Dermatol Venereol Leprol 2014; 80:5–14.

10 Gawdat H, Hegazy R, Fawazy M, Fathy M. Autologous platelet rich plasma: topical versus intradermal after fractional ablative carbon dioxide laser treatment of atrophic acne scars. Dermatol Surg 2014; 40:152–161.

11 Nirmal B, Pai SB, Sripathi H, Rao R, Prabhu S, Kudur MH, *et al.* Efficacy and safety of erbium-doped yttrium aluminium garnet fractional resurfacing laser for treatment of facial acne scars. Indian J Dermatol Venereol Leprol 2013; 79:193–198.

12 Lloyd J. The use of microdermabrasion for acne: a pilot study. Dermatol Surg 2001; 27:329–331.

13 Shim E, Barnette D, Hughes K, Greenway H. Microdermabrasion: a clinical and histopathologic study. Dermatol Surg 2001; 27:524–530.

14 Shw T, MurListyarini S. Combination treatment of skin needling, platelet‐rich plasma and glycolic acid 70% chemical peeling for atrophic acne scars in fitzpatrick's skin type IV–VI. J Clin Exp Dermatol Res 2016; 7:364.

15 Eman R, Amira A, Alaa G, Asmaa M, Mahmoud R. Platelet rich plasma is

a useful therapeutic option in melasma. J Dermatol Treat 2019; 30:396–401.

16 Goodman G, Baron J. Postacne scarring: a quantitative global scarring grading system. J Cosmetic Dermatol 2006; 5:48–52.

17 Lotfi R, Moneib H, Yehia H. Clinical and histopathological evaluation of percutaneous collagen induction (dermaroller) in the treatment of postacne scars. J Egypt Women's Dermatol Soc 2013; 10:152–159.

18 Dreno B, Khammari A, Orain N, Noray C, Merial-kieny C, Mery S, *et al.* ECCA grading scale: an original validated acne scar grading scale for clinical practice in dermatology. Dermatology 2007; 214:46–51.

19 Faghihi G, Keyvan S, Asilian A, Nouraei S, Behfar S, Nilforoushzadeh M. Efficacy of autologous platelet-rich plasma combined with fractional ablative carbon dioxide resurfacing laser in treatment of facial atrophic acne scars: a split- face randomized clinical trial. Indian J Dermatol Venereol Leprol 2016; 82:162–168.

20 Yadav C, Meherda M, Kothiwala R, Deepak B, Kumar R, Sharma C. A comparative study of efficacy of micro-needling alone versus micro-needling with autologous platelet rich plasma in facial atrophic acne scars. IMJ Health 2017; 3:268–274.

21 Gollnick H, Cunliffe W, Berson D, Dreno B, Finlay A, Leyden J, Shalita A, *et al.* Management of acne: a report from a Global Alliance to Improve Outcomes in Acne. J Am Acad Dermatol 2003; 49:1–37.

22 Holland D, Jeremy A, Roberts S, Seukeran D, Layton A, Cunliffe W. Inflammation in acne scarring: a comparison of the responses in lesions from patients prone and not prone to scar. Br J Dermatol 2004; 150:72–81.

23 Niti K. Standard guidelines of care for acne surgery. Indian J Dermatol 2008; 74:28–36.

24 Wahab A, Anandan V, Kumar M, Shukla S. Efficacy and safety of platelet rich plasma (PRP) as monotherapy in the management of acne scars in a tertiary care centre. Indian J Clin Exp Dermatol 2017; 3:119–123

25 Nofal E, Helmy A, Nofal A, Alakad R, Nasr M. Platelet-rich plasma versus CROSS technique with 100% trichloroacetic acid versus combined skin needling and platelet rich plasma in the treatment of atrophic acne scars: a comparative study. Dermatol Surg 2014; 40:864–873.

26 Gómez L, Romero V. The use of platelet-rich plasma in the treatment of acne and its scars: a pilot study. Surg Cosmetic Dermatol 2017; 9:156–159.

27 Elkahky H, Fathy G, Abu-zahra F, Afify A. Autologous adipose-derived adult stem cells injection versus platelet-rich plasma injection in the treatment of rolling postacne scars. J Egypt Women's Dermatol Soc 2016; 13:165–172.

28 Arora S. A study of efficacy of microdermabrasion in treatment of facial acne scars: original research. Int J Dent Med Special 2014; 1:11–19.