

Original Article

Comparative Evaluation of Microneedling Alone Versus Microneedling Combined with Platelet-Rich Plasma in the Treatment of Post-Traumatic Facial Scars

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Abstract

Background: Post-traumatic facial scars can cause significant cosmetic concern and psychological distress because of their visible location and effect on facial appearance. Microneedling is a minimally invasive procedure that promotes collagen remodelling and has been used successfully in scar management. Platelet-rich plasma has been proposed as an adjunct to microneedling because of its regenerative and wound-healing properties. However, limited data are available on its comparative benefit specifically in post-traumatic facial scars. The study was hence conducted to compare the efficacy and safety of microneedling alone versus microneedling combined with platelet-rich plasma in the treatment of post-traumatic facial scars.

Materials and Methods: This prospective comparative interventional study included 30 patients with clinically stable post-traumatic facial scars. Patients were divided into two groups of 15 each. Group A was treated with microneedling alone, while Group B was treated with microneedling followed by autologous platelet-rich plasma. Four treatment sessions were performed at 4-week intervals. Assessment was done at baseline and 3 months after the final session using the Patient and Observer Scar Assessment Scale, Vancouver Scar Scale, physician global improvement, patient satisfaction score, and adverse effect monitoring.

Results: Both groups showed improvement in scar appearance after treatment. However, the microneedling plus platelet-rich plasma group demonstrated significantly greater improvement in POSAS observer score, POSAS patient score, and Vancouver Scar Scale score compared with the microneedling-alone group. Patient satisfaction was also significantly higher in the combination group. Procedural pain, downtime, and adverse effects were comparable in both groups, and no major complication was observed.

Conclusion: Both treatment modalities were effective and well tolerated in the management of post-traumatic facial scars. Microneedling combined with platelet-rich plasma produced superior scar improvement and higher patient satisfaction

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compared with microneedling alone. The addition of platelet-rich plasma enhanced treatment outcome without increasing morbidity. This combined approach may therefore be considered a promising option for post-traumatic facial scar revision.

Keywords: Post-traumatic facial scars; Microneedling; Platelet-rich plasma; Scar remodeling; Vancouver Scar Scale

INTRODUCTION:

Facial scars that develop after trauma can produce long-lasting cosmetic and psychological concerns. When these scars are located on visible areas of the face, they may affect self-confidence, social interaction, and overall quality of life. Their treatment is often difficult because post-traumatic scars vary in depth, texture, pigmentation, and degree of dermal fibrosis. Many conventional options such as topical agents, surgical revision, chemical peeling, dermabrasion, and laser resurfacing may improve scar appearance, but they can also involve higher cost, longer recovery, or risk of pigmentary alteration, especially in darker skin types. [1-4]

Microneedling, also called percutaneous collagen induction therapy, has emerged as a minimally invasive technique for scar remodelling. By creating controlled micro-injuries in the skin, it stimulates neocollagenesis, neoelastogenesis, and dermal remodeling while preserving the epidermis to a large extent. Because of its relatively short downtime, favorable safety profile, and suitability for different scar types, microneedling has become an attractive option in aesthetic and reconstructive dermatology. Studies on facial scars, acne scars, postsurgical scars, and other non-atrophic scars have reported meaningful clinical improvement after serial microneedling sessions. [1-5]

Platelet-rich plasma (PRP) has also gained attention as an adjunctive therapy because it contains concentrated growth factors that may enhance wound healing, fibroblast activity, angiogenesis, and collagen synthesis. When combined with microneedling, PRP may penetrate more effectively through the microchannels and may accelerate tissue repair and improve scar quality. Comparative studies and meta-analyses, mainly in acne scars, suggest that combining PRP with microneedling may offer additional benefit over microneedling alone, although results are not fully uniform across all studies. [6-8] However, evidence focused specifically on post-traumatic facial scars remains limited. Therefore, a comparative evaluation of microneedling alone versus microneedling combined with PRP is clinically relevant to determine whether the addition of PRP provides superior scar improvement in this patient group.

MATERIALS AND METHODS:

This prospective comparative interventional study was carried on patients presenting with post-traumatic facial scars. Patients aged 18 to 50 years with clinically stable facial scars of at least 6 months' duration were included in the study. Only those scars that were post-traumatic in origin and cosmetically significant to the patient were considered. Patients with active acne or infection over the treatment area, keloidal tendency, bleeding disorders, uncontrolled diabetes mellitus, platelet dysfunction, use of anticoagulants, pregnancy, lactation, active herpes infection, or history of any scar procedure in the previous 6 months were excluded.

A total of 30 patients were enrolled and allocated into two groups of 15 each. Group A was treated with microneedling alone, while Group B was treated with microneedling followed by autologous platelet-rich plasma. Before treatment, detailed history was recorded and all patients underwent clinical examination, baseline scar photography, and scar grading using the Patient and Observer Scar Assessment Scale (POSAS) and Vancouver Scar Scale (VSS). POSAS is an established tool that has been used prospectively in post-traumatic and surgical facial scar assessment.

In both groups, topical anesthetic cream was applied for 45 minutes before the procedure. Microneedling was performed with a dermapen/dermaroller under aseptic precautions using a needle depth adjusted according to scar thickness and site, usually between 1.5 and 2.5 mm, until uniform pinpoint bleeding was achieved. In Group B, 15–20 mL of the patient's venous blood was drawn immediately before the procedure and centrifuged to prepare PRP, which was then applied over the treated scar area and gently worked into the microchannels. Four treatment sessions were given at 4-week intervals.

Patients were reviewed before each session and again 3 months after the final sitting. Outcome measures included POSAS observer score, POSAS patient score, VSS score, physician global improvement, patient satisfaction, and adverse effects such as erythema, edema, post-inflammatory hyperpigmentation, and procedural pain. Data were analyzed using appropriate statistical tests, and a p value of less than 0.05 was considered statistically significant.

RESULTS:

the highest resistance followed by ZOE and then Polyvinyl Siloxane. (Table 2) A total of 30 patients with post-traumatic facial scars completed the study, with 15 patients each in the microneedling-alone group and the microneedling-plus-PRP group.

Table 1. Baseline demographic and scar characteristics of the study groups

Variable	Microneedling alone (n=15)	Microneedling + PRP (n=15)	Test value	p value
Age (years), Mean \pm SD	27.93 \pm 5.84	28.47 \pm 6.12	t = 0.25	0.806
Male, n (%)	9 (60.0)	8 (53.3)	$\chi^2 = 0.14$	0.705
Female, n (%)	6 (40.0)	7 (46.7)		
Duration of scar (months), Mean \pm SD	13.40 \pm 4.26	12.87 \pm 3.95	t = 0.35	0.729
Linear scars, n (%)	7 (46.7)	6 (40.0)	$\chi^2 = 0.14$	0.931
Depressed scars, n (%)	5 (33.3)	6 (40.0)		
Mixed scars, n (%)	3 (20.0)	3 (20.0)		
Baseline POSAS observer score, Mean \pm SD	31.87 \pm 4.18	32.20 \pm 4.05	t = 0.22	0.829
Baseline POSAS patient score,	33.13 \pm 4.72	33.67 \pm 4.51	t = 0.32	0.754

Mean \pm SD				
Baseline VSS score, Mean \pm SD	8.07 \pm 1.28	8.27 \pm 1.22	t = 0.44	0.664

Table 1 shows that both study groups were comparable at baseline with respect to age, sex distribution, scar duration, scar type, and baseline POSAS and VSS scores. None of these variables showed a statistically significant difference between the microneedling-alone group and the microneedling-plus-PRP group. This indicates that the two groups were well matched before treatment and suitable for comparative outcome assessment.

Table 2. Comparative improvement in scar scores after treatment

Variable	Microneedling alone Baseline Mean \pm SD	Microneedling alone Final Mean \pm SD	Microneedling + PRP Baseline Mean \pm SD	Microneedling + PRP Final Mean \pm SD	p value (final comparison)
POSAS observer score	31.87 \pm 4.18	21.53 \pm 3.76	32.20 \pm 4.05	17.87 \pm 3.22	0.009*
POSAS patient score	33.13 \pm 4.72	22.40 \pm 4.01	33.67 \pm 4.51	18.53 \pm 3.67	0.011*
VSS score	8.07 \pm 1.28	5.27 \pm 1.03	8.27 \pm 1.22	4.13 \pm 0.92	0.003*
Percentage reduction in POSAS observer score	—	32.4 \pm 8.7	—	44.5 \pm 9.3	<0.001*
Percentage reduction in POSAS patient score	—	32.1 \pm 9.1	—	44.7 \pm 10.2	0.002*

*Significant

Table 2 shows that both treatment groups improved after therapy, as reflected by reduction in POSAS observer score, POSAS patient score, and VSS score from baseline to final follow-up. However, the microneedling-plus-PRP group showed significantly greater final improvement and a higher percentage reduction in scar scores compared with the microneedling-alone group. These findings suggest that the addition of PRP enhanced the overall effectiveness of microneedling in post-traumatic facial scars.



Figure 1 and Figure 2 shows the pre and post procedural photographs of a patient

Table 3. Patient satisfaction, physician global assessment, and adverse effects

Variable	Microneedling alone (n=15)	Microneedling + PRP (n=15)	Test value	p value
Procedural pain score (VAS 0–10), Mean \pm SD	4.87 \pm 1.06	4.53 \pm 1.13	t = 0.84	0.408
Downtime (days), Mean \pm SD	2.93 \pm 0.70	2.67 \pm 0.62	t = 1.08	0.289
Patient satisfaction score (0–10), Mean \pm SD	7.27 \pm 0.96	8.47 \pm 0.83	t = 3.65	0.001*
Excellent improvement, n (%)	2 (13.3)	6 (40.0)	$\chi^2 = 4.28$	0.038*
Good improvement, n (%)	7 (46.7)	7 (46.7)		
Fair improvement, n (%)	5 (33.3)	2 (13.3)		
Poor improvement, n (%)	1 (6.7)	0 (0.0)		
Persistent erythema >48 hours, n (%)	3 (20.0)	2 (13.3)	Fisher exact	1.000
Edema, n (%)	2 (13.3)	3 (20.0)	Fisher exact	1.000
Post-inflammatory hyperpigmentation, n (%)	1 (6.7)	0 (0.0)	Fisher exact	1.000
No significant adverse effect, n (%)	11 (73.3)	12 (80.0)	$\chi^2 = 0.19$	0.665

*Significant

Table 3 shows that patient satisfaction was significantly higher in the microneedling-plus-PRP group, and a larger proportion of patients in this group achieved excellent improvement. Procedural pain and downtime were similar in both groups, with no statistically significant difference. Adverse effects were mild, infrequent, and comparable between the two groups, indicating that both treatment modalities were safe and well tolerated.

DISCUSSION

The present study compared microneedling alone with microneedling combined with platelet-rich plasma in the management of post-traumatic facial scars. Both treatment groups showed clear clinical improvement from baseline, but the combination group demonstrated greater reduction in POSAS observer score, POSAS patient score, and VSS score at the final follow-up. Patient satisfaction was also significantly higher in the microneedling plus PRP group, whereas procedural pain, downtime, and adverse effects were comparable between the two groups. These findings suggest that microneedling itself is an effective scar remodeling method, but the addition of PRP may enhance the final quality of scar improvement in facial scars. [9-16]

An important strength of the present study was the comparable baseline profile of the two groups. There was no significant difference in age, sex distribution, scar duration, scar type, or baseline scar scores, which indicates that the post-treatment differences were more likely related to the intervention rather than pre-existing imbalance. The overall

improvement seen in both groups agrees with previous studies showing that microneedling alone can improve scar texture, pliability, and overall appearance by stimulating collagen remodeling and dermal repair. Earlier clinical studies by Fabbrocini et al., Chawla, and Ibrahim et al. also reported meaningful scar improvement after serial microneedling-based treatment, confirming that controlled dermal injury remains a useful and minimally invasive option for facial scar revision. [9-12]

The main finding of the present study was that the microneedling plus PRP group showed significantly better final scar scores than the microneedling-alone group. This pattern is in line with several comparative studies in atrophic facial scars, especially acne-scar studies, where the addition of PRP produced greater reduction in scar severity scores and better overall cosmetic response. Ibrahim et al. found superior outcomes when PRP was combined with microneedling compared with microneedling alone, and similar conclusions were reported by El-Domyati et al. and Porwal et al. in comparative clinical studies. Although the available direct evidence for post-traumatic facial scars is still limited, the present findings are biologically plausible and clinically consistent with the broader scar-remodeling literature. [11-14]

The better outcome in the combination group may be explained by the regenerative properties of PRP. Platelet-rich plasma contains multiple growth factors that may support fibroblast activity, angiogenesis, extracellular matrix remodeling, and faster tissue repair. When PRP is applied after microneedling, the microchannels produced by the needles may improve its delivery into the dermis and may create a more favorable environment for collagen reorganization. This may explain why the combination group in the present study showed better observer-rated and patient-rated improvement, along with higher satisfaction scores. Histologic and clinical comparisons by El-Domyati et al. and the broader systematic review by Hesseler and Shyam also support the view that PRP can act as a useful adjunct in selected scar patients, even though the magnitude of benefit may vary between studies. [13-15]

Another clinically relevant finding in our study was the absence of a major difference in procedural pain, downtime, or adverse effects between the two groups. Persistent erythema, edema, and post-inflammatory hyperpigmentation were infrequent and self-limiting in both groups. This is comparable to earlier studies in which microneedling, with or without PRP, was generally well tolerated and associated with only mild transient side effects. Chawla, Ibrahim et al., and Porwal et al. also described favorable tolerability profiles, which supports the practical usefulness of these procedures in facial scar treatment, particularly when a low-downtime option is preferred. [10,12,14,15]

At the same time, the literature also shows that the added value of PRP is not uniform across all scar types and all treatment modalities. While many microneedling-based studies report superior outcomes with PRP, some scar studies using other techniques have shown less clear advantage. Godara et al., in a prospective study on postburn and post-traumatic scars treated with fractional CO₂ laser with or without PRP, found improvement in both groups but no significant added benefit from PRP. This suggests that the role of PRP may depend on the scar type, route of delivery, treatment platform, and assessment method. Therefore, the positive effect seen in the present study should be interpreted as specific to a microneedling-based protocol in post-traumatic facial scars rather than generalized to every scar intervention. [15,16]

The higher patient satisfaction observed in the microneedling plus PRP group is also important from a clinical perspective. In facial scar treatment, patient perception often determines whether a therapy is considered successful, because small visible changes may have a strong emotional and social impact. The better patient-rated scores in our study likely reflect improvement in surface irregularity, texture, and cosmetic acceptability rather than only objective score reduction. Porwal et al. also highlighted quality-of-life benefit with PRP-assisted treatment, and this supports the idea that adjunctive PRP may provide not only clinical improvement but also greater subjective acceptance of the final scar appearance. [14]

The present study had some limitations. The sample size was relatively small, the follow-up period was limited, and scar subtype-specific response was not analyzed separately in depth. In addition, histologic confirmation of collagen remodeling was not performed. Even so, the prospective design, standardized photography, and use of validated scar assessment tools strengthened the findings. Within these limits, the present study indicates that both microneedling alone and microneedling combined with PRP are effective for post-traumatic facial scars, but the combined approach appears to produce superior final scar improvement and higher patient satisfaction with no meaningful increase in adverse effects. Larger controlled studies with longer follow-up are needed to confirm the durability of this benefit.

CONCLUSION

Both microneedling alone and microneedling combined with platelet-rich plasma produced significant clinical improvement in post-traumatic facial scars. However, the addition of platelet-rich plasma resulted in greater reduction in scar severity scores and higher patient satisfaction at the end of treatment. The safety profile of both treatment modalities was favorable, with only mild and self-limiting adverse effects. Within the limits of this study, microneedling combined with platelet-rich plasma appeared to be a more effective option than microneedling alone for the management of post-traumatic facial scars.

REFERENCES:

1. Fernandes D. Percutaneous collagen induction: an alternative to laser resurfacing. *Aesthetic Surg J.* 2002;22(3):307-309.
2. Singh A, Yadav S. Microneedling: advances and widening horizons. *Indian Dermatol Online J.* 2016;7(4):244-254.
3. Juhasz MLW, Cohen JL. Microneedling for the treatment of scars: an update for clinicians. *Clin Cosmet Investig Dermatol.* 2020;13:997-1003.
4. Iosifidis C, Goutos I. Percutaneous collagen induction (microneedling) for the management of non-atrophic scars: literature review. *Scars Burn Heal.* 2019;5:2059513119880301.
5. Claytor RB, Sheck CG, Chopra V. Microneedling outcomes in early postsurgical scars. *Plast Reconstr Surg.* 2022;150(3):557e-561e.
6. Gupta M, Barman KD, Sarkar R. A comparative study of microneedling alone versus along with platelet-rich plasma in acne scars. *J Cutan Aesthet Surg.* 2021;14(1):64-71.
7. Kang C, Lu D. Combined effect of microneedling and platelet-rich plasma for the treatment of acne scars: a meta-analysis. *Front Med (Lausanne).* 2022;8:788754.
8. Ebrahimi Z, Alimohamadi Y, Janani M, Hejazi P, Kamali M, Goodarzi A. Platelet-rich plasma in the treatment of scars, to suggest or not to suggest? A systematic review and meta-analysis. *J Tissue Eng Regen Med.* 2022;16(10):875-899.
9. Fabbrocini G, De Vita V, Pastore F, Panariello L, Fardella N, Sepulveres R, et al. Combined use of skin needling and platelet-rich plasma in acne scarring treatment. *Cosmet Dermatol.* 2011;24(4):177-183.
10. Chawla S. Split face comparative study of microneedling with PRP versus microneedling with vitamin C in treating atrophic post acne scars. *J Cutan Aesthet Surg.* 2014;7(4):209-212.

11. Ibrahim ZA, El-Ashmawy AA, Shora OA. Therapeutic effect of microneedling and autologous platelet-rich plasma in the treatment of atrophic scars: a randomized study. *J Cosmet Dermatol.* 2017;16(3):388-399.
12. Ibrahim MK, Ibrahim SM, Salem AM. Skin microneedling plus platelet-rich plasma versus skin microneedling alone in the treatment of atrophic post acne scars: a split-face comparative study. *J Dermatolog Treat.* 2018;29(3):281-286.
13. El-Domyati M, Abdel-Wahab H, Hossam A. Microneedling combined with platelet-rich plasma or trichloroacetic acid peeling for management of acne scarring: a split-face clinical and histologic comparison. *J Cosmet Dermatol.* 2018;17(1):73-83.
14. Porwal S, Chahar YS, Singh PK. A comparative study of combined dermaroller and platelet-rich plasma versus dermaroller alone in acne scars and assessment of quality of life before and after treatment. *Indian J Dermatol.* 2018;63(5):403-408.
15. Hesseler MJ, Shyam N. Platelet-rich plasma and its utility in the treatment of acne scars: a systematic review. *J Am Acad Dermatol.* 2019;80(6):1730-1745.
16. Godara S, Arora S, Dabas R, Arora G, Renganathan G, Choudhary R. A comparative study on the efficacy of fractional CO2 laser and fractional CO2 laser with autologous platelet-rich plasma in scars. *Indian Dermatol Online J.* 2020;11(6):930-936.