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Case Report

Intradermal vs. micro-needling platelet-rich plasma treatment for atrophic acne scars in Fitzpatrick Skin type 5 subjects: Two case reports

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Abstract

Introduction Atrophic scars are the most common and frequent complication of acne. The use of platelet-rich plasma (PRP) through the release of growth factors, cytokines and chemokines from α-granules may aid in the treatment of such atrophic scars.

Objective To compare the effectiveness of intradermal administration of PRP with topical administration using micro-needling for treatment of atrophic acne scars.

Methods Two subjects with atrophic scars were selected. Procedures were performed three times for the first subject and two times for the second subject with an interval of 3 weeks. The right side of the face was treated using intradermal PRP, while the left side was treated using micro-needling PRP. Assessments of clinical improvement were obtained by evaluating the photos of each treatment and assessment of the severity of the scar used the Global Acne Scarring Grading System and Lipper & Perez Score.

Results Facial area treated using intradermal PRP in the first patient experienced an 85.71% improvement in Global Acne Scarring Grading System and 68.59% improvement in Lipper & Perez score after 9 weeks of treatment. While the second patient experienced 64.28% improvement in Global Acne Scarring Grading System and 71.35% improvement in Lipper & Perez score after 6 weeks of treatment. Furthermore, the first patient treated with micro-needling experienced 53.33% improvement in Global Acne Scarring Grading System along with 62.71% improvement in Lipper & Perez Score after 9 weeks of treatment. While the second patient experienced 61.90% improvement in Global Acne Scarring Grading System and 58.65% improvement in Lipper and Perez Score after 6 weeks of treatment.

Conclusion Intradermal administration of PRP is more effective compared to topical administration using micro-needling, especially for boxcars and rolling scars. However, with notably more complications such as edema, pain, and longer downtime.

Key words
Acne scar; Atrophic scar; Platelet-rich plasma; Intradermal; Micro-needling.

Introduction

Acne vulgaris is a chronic inflammatory skin disease that may cause permanent scarring.[1] Scarring occurs during the healing process of active acne lesions and can be caused by all types of lesion of acne, including papules, pustules, comedones, and nodulocystic.[1] Atrophic scar is divided into three types, including icepick, rolling, and boxscars.[2]

Treatment modalities for acne scars are classified based on the expected result. Example of treatment include: resurfacing (reshaping

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structure), lifting through subcision, volume expansion through augmentation of fillers, skin grafting, fat transplant, and platelet rich plasma (PRP), tightening, and surgical removal of tissue.[3] PRP is the use of autologous blood for repair atrophic acne scar.[3] As the name suggests, platelet cells are the main focus of PRP as it is the first cells to reach damaged tissue, and mediate tissue healing through inhibition of growth factors, cytokines, and chemokines from α -granules.[2]

Growth factors are beneficial for collagen stimulation and elastin regeneration. This modality helps to treat boxcars and rolling scars. However, it has shown limited efficacy for icepick scars.[3] PRP can be administered intradermally or applied directly through micro-needling. Intradermal injection of PRP was first reported to improve atrophic scar along with skin rejuvenation properties. Topical PRP is synergistic with skin needling in atrophic scar because skin needling creates an opening for PRP absorption and allows platelet to contribute to wound healing.[2] In the following paper, we compared two cases of PRP administration using intradermal injection and micro-needling using the split face method.

Methods

Study Protocol Two subjects, a male and a female were compared in this study. All subjects agreed to participate in the study and signed an informed consent form. Both subjects had severe acne scars based on the Global Acne Scarring Classification exhibiting of all types of atrophic scars (icepick, rolling, boxcars). All atrophic scars were subcisioned using a 21G cannula to release the underneath fibrosis tissue. The right side of the face was treated with PRP given through intradermal injection. The left side of the face was treated using PRP through micro-needling (Dr. Pen M8, Australia®), inserted using a 16-pin cartridges microneedle with the depth of 1.5 mm. The first subject received two treatment sessions while the second subject received three treatment sessions in a three-week interval. Subjects were objectively assessed using the Global Acne Scarring Classification and Lipper dan Perez Score. Digital photographs of the subjects were taken using Canon EOS 1300D DSLR camera (18MP), using standardized settings of camera height, room lighting, photo background, and subject position (front view and facial profile). Clinical evaluation, digital photography, and both scores were evaluated from each visit.

Scoring systems for subject evaluation Scoring systems used were the Quantitative Global Acne Scarring Grading System based on the number and type of scars. Macular and mild atrophic scars are given 1-point, moderate atrophic scars are given 2-points, severe atrophic scars are given 3-points, and hyperplastic scars are given 4-points. The total score was then multiplied by a coefficient depending on the number of lesions. Final scores range from 0-84.[4] Lipper and Perez Score, was acquired using the formula: M = number of rolling scars ×1 + number of boxcars ×2 + Ice picks ×3.

Results

The first subject, a 28-year-old male complained of acne scars on his bilateral cheeks, and forehead six years prior. The skin type of the subject was Fitzpatrick type V and dermatological examination revealed multiple of icepick rolling, and boxcars (**Figure 1**). The second subject, a 22-year-old female subject presented with multiple atrophic acne scars on her bilateral cheeks and forehead, three years prior. The subject had Fitzpatrick type V skin and Dermatological examination revealed icepick, rolling, and boxcars (**Figure 2**).

Table 1 and 2 describe the acne scar severity upon initial visit and after treatment on the right

Figure 1 Initial Baseline Clinical Picture (A) and Scar improvement on Week-3,6,9 (B-D).

and left side of the face respectively. First subject had more severe atrophic acne scar compared to the left side of the face **(Figure 1A)**. Meanwhile, the second subject showed similar acne scar severity on both sides of the face **(Figure 2A)**. At the end of the treatment sessions both subjects were satisfied with results and experienced excellent improvement confirmed through the decrease in both Global Acne Scarring Classification and Lipper and Perez Score **(Figure 3 and 4)**.

Both subjects acknowledged more improvement on the right side of the face. However, less pain was experienced by both subjects on the left side. Post procedural erythema and edema experienced by subjects subside within 1-2 days after the procedure. Neither subject experienced postoperative hyperpigmentation, allergic reactions, infection, hypertrophic scarring, or keloid formation. Both subjects were advised to avoid sunlight, and to apply regular moisturizers and sunscreen after the treatment. In addition, subjects were advised to not perform strenuous activities ten days after the procedure.

Discussion

PRP is a highly concentrated platelet plasma obtained from whole blood. It contains >1100 different proteins, including immune system carriers, enzymes, and growth factors. These proteins contribute to various biological processes, such as cellular proliferation and differentiation, matrix remodeling, angiogenesis, and collagen deposition. In addition, they also promote wound healing and tissue regeneration, with growth factor being the most essential component.[5] The effectiveness of PRP application for acne scars has been proven in various studies. One study of evaluated its effectiveness for acne scars in subjects with Fitzpatrick's skin types IV and V showed significant improvement in all types of atrophic scars, with the rolling scars responding better to treatment compared to boxcars but less effective compared to ice pick scars.[6,7]

PRP was conducted in three sessions for the first subject and two sessions for the second subject with an interval of three weeks. On the right side of the face, PRP was injected intradermally, while on the left side of the face, PRP was applied through micro-needling.

Table 1 Comparison of acne scar severity on the right side of the face.

Scoring System	*Baseline*		*3rd Week*		*6th Week*		*9th Week*	
	P1	*P2*	*P1*	*P2*	*P1*	*P2*	*P1*	*P2*
Global Acne Scarring Classification	42	42	30	29	19	15	6	-
Lipper dan Perez Score	121	206	93	90	58	59	38	-

*P1: 1st subject P2: 2nd subject.

Table 2 Comparison of acne scar severity on the left side of the face.

Scoring System	*Baseline*		*3rd Week*		*6th Week*		*9th Week*	
	P1	*P2*	*P1*	*P2*	*P1*	*P2*	*P1*	*P2*
Global Acne Scarring Classification	30	42	20	30	15	16	14	-
Lipper dan Perez Score	118	208	89	113	61	86	44	-

*P1: 1st subject P2: 2nd subject.

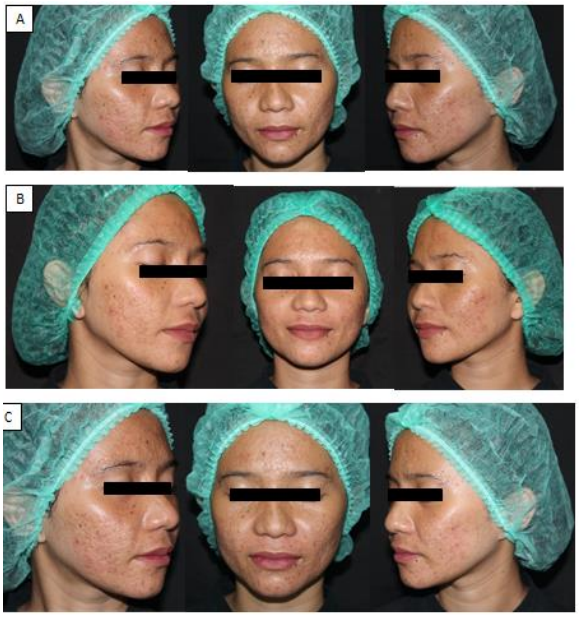

Figure 2 Initial Baseline Clinical Picture (A) and Scar improvement on Week-3 and 6 (B-C).

Clinical improvements were more prominent on the right side of the face, similar to reports by other studies.[8] In a literature review, there are mixed results regarding the effectiveness in the use of PRP with micro-needling for acne scars.[9] One prospective randomized trial study compared intradermal and micro-needling PRP as an adjuvant treatment to fractional ablative (FAL) carbon dioxide (CO_2) laser and found no significant differences in scar improvements.[10]

Other case reports compared topical PRP application methods and needling with PRP injection and subcision, as well as a combination of the two methods. It was reported that all subjects had overall smoother facial skin three weeks after treatment. In addition, there was a reduction in the degree of lesion severity. However, a superior PRP application method could not be concluded.[11] The heterogenicity in the results of these studies may be due to differences in treatment protocols, study design including treatment groups, and the clinical outcome measured.[8] A meta-analysis showed larger effects of intradermal PRP injection compared to topical PRP application combined with micro-needling.[12] However, another study that evaluated PRP as an adjuvant treatment to FAL CO_2 therapy showed no significant improvement. This might be due to FCL having the ability to facilitate penetration of topical PRP through the microchannels, leading to transdermal delivery.[10]

The use of PRP as an adjuvant treatment for acne scars has been widely explored as it was reported to be able to reduce both the number of treatments sessions and cost of treatment. A similar study using split-face method found that areas of the face treated with subcision and PRP injection improved by 32.08% in the Goodman and Baron Qualitative grading compared to 8.33% in those treated with only subcision. The subjects subjective score also increased by 45.28% on subjects treated with subcision and PRP compared to 20.74% on the control part.

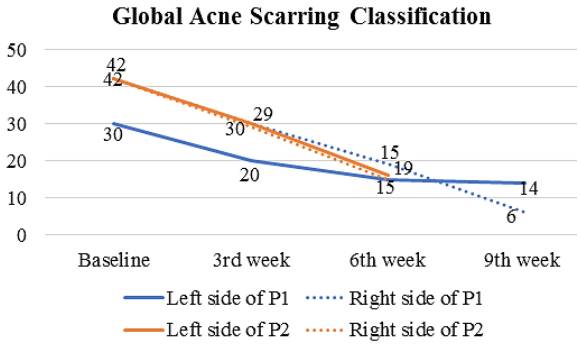

Figure 3 Comparison of acne scar severity using Global Acne Scarring Classification. Right side of first subject showed more improvement than left side. Meanwhile, similar improvement was found on both sides of second subject.

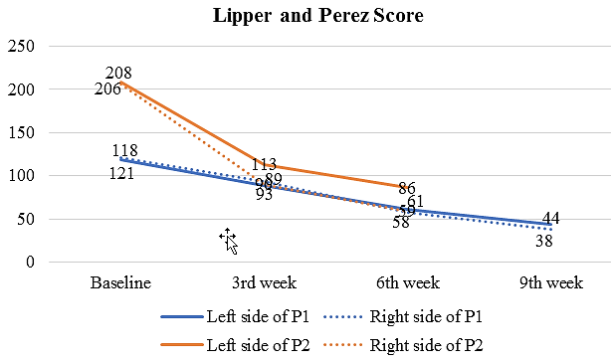

Figure 4 Comparison of acne scar severity using Lipper and Perez Score. All subjects showed more improvement on their right side compared to their left side.

Subjective score was based on the subjective judgment of scar severity on a scale of 0-10 (10 and 0 representing maximum severity and no scars, respectively.[13] Another study was conducted on grade 4 acne scars compared two groups of subjects, with the first group treated with subcision and needling procedures, and the second group treated with subcision, needling, followed with topical PRP. Results showed there was a ≥50% improvement of acne scars in the second group compared to the first group.[14]

This case report is a comparison study of PRP application in two subjects using micro-needling and intradermal injections using the split-face method. All scars underwent subcision prior to PRP application. This case report, supported by a meta-analysis study, showed that the outcome of combination of PRP injection and micro-needling was superior compared to topical PRP application and micro-needling. This may be explained due to the ability of PRP injections to penetrate and directly reach the dermis, whereas the depth of PRP application by micro-needling is more superficial.[15] Direct application of PRP to damaged skin tissue activates high concentrations of growth factors such as cellulose, fibronectin, and vitronectin that aid in repair of damaged skin. At the molecular level, PRP injection stimulates DNA synthesis and gene expression.[5,6,16]

However, PRP injection also has its disadvantages. In this case, subjects experienced more notable discomfort and pain on intradermal injections compared to micro-needling. Although the complaint was still manageable by the subjects. Subjects also reported mild erythema and edema that lasted for approximately 24 hours, followed by hyperpigmentation of both cheeks in one subject at the end of treatment.[6,10]

Conclusion

Intradermal injection of PRP after subcision showed better results compared to micro-needling. However, side effects such as discomfort and pain were more prominent with PRP administration.

References

1. Clark AK, Saric S, Sivamani RK. Acne Scars: How Do We Grade Them? *Am J Clin Dermatol*. 2018;**19(2)**:139-44.
2. Connolly D, Vu HL, Mariwalla K, Saedi N. Acne Scarring-Pathogenesis, Evaluation, and Treatment Options. *J Clin Aesthet Dermatol*. 2017;**10(9)**:12-23.
3. Bhargava S, Cunha PR, Lee J, Kroumpouzos G. Acne Scarring Management: Systematic Review and Evaluation of the Evidence. *Am J Clin Dermatol*. 2018;**19(4)**:459-77.
4. Goodman GJ, Baron JA. Postacne scarring: a qualitative global scarring grading system. *Dermatol Surg*. 2006;**32(12)**:1458-66.
5. Du R, Lei T. Effects of autologous platelet-rich plasma injections on facial skin rejuvenation. *Exp Ther Med*. 2020;**19(4)**:3024-30.
6. Gulanikar A, Vidholkar R. Efficacy of platelet-rich plasma in acne scars. *Clin Dermatol Rev*. 2019;**3(2)**:109-14.
7. Mikhael NW, Hamed AM, Malek NH. Efficacy of Platelet Rich Plasma in Treatment of Acne Scars. *Benha J Appl Sci*. 2021;**6(3)**:25-7.
8. Pixley JN, Cook MK, Singh R, Larrondo J, McMichael AJ. A Comprehensive Review of Platelet-Rich Plasma in the Treatment of

Dermatologic Disorders. *J Dermatolog Treat*. 2022:1-33.
9. Nanda S, Chauhan K, Shetty V, Dashore S, Bhatia S. Platelet-Rich Plasma in Aesthetics. *Indian Dermatol Online J*. 2021;**12(Suppl 1)**:S41-s54.
10. Gawdat HI, Hegazy RA, Fawzy MM, Fathy M. Autologous platelet rich plasma: topical versus intradermal after fractional ablative carbon dioxide laser treatment of atrophic acne scars. *Dermatol Surg*. 2014;**40(2)**:152-61.
11. yustin E. The Combination of Platelet Rich Plasma with Skin Needling or Subcision for Postacne Scaring: a Serial Case Study. *J Stem Cell Res Tissue Eng*. 2020;3(2):47-55.
12. Long T, Gupta A, Ma S, Hsu S. Platelet-rich plasma in noninvasive procedures for atrophic acne scars: A systematic review and meta-analysis. *J Cosmet Dermatol*. 2020;**19(4)**:836-44.
13. Deshmukh NS, Belgaumkar VA. Platelet-Rich Plasma Augments Subcision in Atrophic Acne Scars: A Split-Face Comparative Study. *Dermatol Surg*. 2019;**45(1)**:90-8.
14. Bhargava S, Kroumpouzos G, Varma K, Kumar U. Combination therapy using subcision, needling, and platelet-rich plasma in the management of grade 4 atrophic acne scars: A pilot study. *J Cosmet Dermatol*. 2019;**18(4)**:1092-7.
15. Yepuri V, Venkataram M. Platelet-Rich Plasma with Microneedling in Androgenetic Alopecia: Study of Efficacy of the Treatment and the Number of Sessions Required. *J Cutan Aesthet Surg*. 2021;**14(2)**:184-90.
16. Garg A, Chaudhary SS. Efficacy of dermaroller on morphology of acne scars: analytical and prospective study. *Int J Res Dermatol*. 2017;**3**:399-402.