The Egyptian Journal of Hospital Medicine (October 2021) Vol. 85 (2), Page 4323-4327

Treatment of Atrophic Acne Scars with Platelet Rich Plasma Gel and Micro-needling

Enas Tarek Shafik*, Amany Abd El-Rahman Nassar,
Amira Amin Salem Tawoos, Nashwa Kamal Radwan, Doaa Hosny Abd EL-Fattah
Dermatology, Venereology and Andrology Department, Faculty of Medicine, Zagazig University, Sharkia, Egypt
***Corresponding author:** Enas Tarek Shafik, **E-Mail:** nosatarek91@gmail.com

ABSTRACT

Background: Following the advancements in the treatment of acne, post-acne scarring is still a widespread problem. Platelet-rich plasma (PRP) gel is one formulation with beneficial biological or medicinal qualities that aid in the management of post-acne scarring.

Objective: It was the goal of this work to evaluate the utilization of treatment of post-acne scars with micro-needling and plasma gel.

Patients and Methods: Patients with post-acne scars were recruited from the university hospital's dermatology and venereology outpatient clinic. Our study was based on 23 patients (8 males= 34.8%, 15 females= 68.2%) having 3 skin types (II, III, IV); skin type III patients representing 56.2% of total patients, most of these patients have scars for less than 10 years. Dermapen has been done to the face then the PRP gel has been applied combined with micro-needling to the post-acne scars. We performed four sessions of the previous treatment with two weeks intervals then one month's follow-up.

Results: The baron, as well as Goodman scale improvement significantly post-treated with Platelet Rich Plasma Gel Combined with micro-needling, where 69.6% of cases become grade1 post-treatment, drop grade 3 to be (8.7%) post-treatment compared to (47.8%) pre-treatment the difference statistically significant p=0.022. Furthermore, all grade4 fade out post-treatment p=0.008.

Conclusion: Dermapen combined with plasma gel is a promising effective therapeutic modality for atrophic acne scars.

Keywords: Platelet Rich Plasma Gel, Post Acne Scars.

INTRODUCTION

Inflammatory skin disease of the pilosebaceous glands, acne often begins during adolescence and may continue throughout adulthood, with flares often occurring when testosterone levels rise. More than forty percent of adults, as well as eighty-five percent of teenagers, are affected by late-onset acne. Environment, as well as genetics both, play a role in its prevalence and severity, making it one of the most common dermatological conditions globally [(1)]. It's still a widespread condition even though acne therapy has improved greatly. The prevention and management of scarring is a continuing concern [(2)].

Due to decreased or increased collagen deposition in the skin, acne scars may be caused by the impaired breakdown of subcutaneous fat, collagen fibers as well as, inflammatory mediators [(3)].

The "healing cascade" refers to the body's inherent ability to repair damaged tissue at the location of an injury. Platelets, white blood cells, and plasma include proteins that influence clot formation, inflammation, and cell proliferation in the early stages of this cycle. Multiple plasma proteins and activated platelet membranes work together to generate a clot [(4)]. For many years, the idea of using a patient's blood or components to assist the healing process has been widely used [(5)].

There are many ways to employ platelet-rich plasma (PRP) to promote wound healing. Platelet concentrates and platelet gels for local application are designed to increase the availability of the various proteins at the damage site [(4)]. An original blood composition that contains proteins in a gelled condition as the result of thermal heating and cooling treatment yields plasma gel, one of the PRP formulations with beneficial biological or medicinal features [(6)].

Because it is injected into the subcutaneous fat layer, and dermis in a manner that is both gentle and natural, plasma gel is an excellent filler [(7)]. The possible benefit of employing a self-derived product is the prevention of problems and undesirable consequences from the immune response [(8)].

Because it creates hundreds of microclefts in the epidermis, micro-needling allows growth factors to penetrate deeper into the dermis [(9)].

It was the goal of this work to evaluate the utilization of treatment of post-acne scars with micro-needling and plasma gel.

PATIENTS AND METHODS

Outpatient clinic admissions at the Dermatology, Venereology, and Andrology Department included 23 subjects with post-acne scars. Patients from Zagazig University Hospitals' Faculty of Medicine, Sharka, Egypt were randomized to participate in this randomized crossover design-controlled study. As long as all participants signed informed consent forms and submitted them to Zagazig University's research ethics committee, the study was allowed (ZU-IRB#6260). We

Received: 6/08/2021
Accepted: 2/10/2021

followed the World Medical Association's ethical code for human experimentation, the Helsinki Declaration.

Inclusion criteria: Both sexes participants, aged more than 18 years, with facial atrophic post-acne scars.

Exclusion criteria: Patients using anticoagulation therapy, with chronic liver disease, platelet disorders, Pregnant and lactating females, diabetic patients, active acne**,** keloid history, and active herpes labialis.

This is what all of the participants in this research had to go through:

History: The patient's age, sex, gender, were all recorded in a thorough medical history.

Clinical examination:

General evaluation of all body systems in addition to a detailed dermatological examination before and after each treatment session. The degree of the post-acne scar was assessed using a qualitative grading system **(10).**

Photographs; were taken in standard fashion before and after every treatment session, also after one month of the end of treatment course using the mobile camera (oppo reno 4 pro, 48 megapixels).

Before treatment and one month following treatment, 3mm punch probes were used to obtain skin biopsy specimens from the sides of the face.

GAIS, Goodman and Baron Scale, and patients' self-satisfaction (poor, fair, good, very good, excellent) assessment were used to evaluate the results.

Procedure:

- Before the operation, the affected region is disinfected with alcohol 70%.
- After applying a thick layer of a local anesthetic cream to the face for around 45 to 60 minutes before the treatment (eutectic mixture of lidocaine and prilocaine EMLA cream, APP Pharmaceuticals, Fresenius Kabi, USA) The cream was removed with care.
- After preparation of the area with alcohol, needling is done by derma pen (My M length of the microneedle 0.25-2.5mm, depth 2.0mm, needle no: 12 needles, width: 2cm diameter) in the horizontal, vertical, and oblique directions, the PRP gel(1-2ml) will be applied to the right side of the face and amniotic fluid gel(1-2ml) on the left side and left to dry for 30 minutes.
- Fusidic acid ointment (Fucidin) was applied for 24 hours to prevent the spread of microorganisms. After that, using sunscreens with an SPF of at least 50 was critical, both during treatment and for one month following its conclusion.

A total of ten milliliters of venous blood were drawn in sterile circumstances. Tubes containing sodium citrate (9:1), an anticoagulant, were used to collect all of the blood from the patient. Two centrifugation stages were performed on citrated whole blood **(11).** Separating plasma and platelets from red and white blood cells requires initial centrifugation (soft spin) at 1500 g for 10 minutes. Second centrifugation at 2500 g for 5 minutes resulted in the separation of the plasma into PPP (platelet-poor plasma), and PRP (platelet-rich plasma), both of which included suspended platelets. After centrifugation, the lowest 1-2 cc of the plasma is PRP concentrate.

PRP has been prepared and injected into syringes. Using a hot water channel (60–100° C) for one minute and a cold water bath (8–0° C) for another, the syringes were used to turn plasma into a thick gel.

The Goodman and Baron scale was used to rate the scaring improvement of a building. It is deemed exceptional if a student gains two grades, good if he or she gains one, and low if there is no progress. A three-week interval separated the four sessions.

Assessment:

Clinical assessment: By taking photographs before and at the end of treatment, after one month follows up and comparing between them by 2 blinded physicians using the Global Aesthetic Improvement Scale (GAIS) **(12)**. This scale is divided into 5 categories according to the response of treatment to: very much improved, much improved, improved, no change, worse.

Overall satisfaction was rated at the end of the study based on how satisfied the patient was with the overall experience **(13).**

Ethical Considerations:

The study was approved by the Ethics Board of Zagazig University and an informed written consent was taken from each participant in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

We used IBM SPSS Statistics program version 23 for Windows to tabulate and analyze the data. The independent t-test (t) and the Mann-Whitney (MW) tests were employed to compare parametric and non-parametric data, respectively, in the analysis of the differences between the groups. When there was a difference between two groups of non-parametric data, the Kruskal-Wallis test (KW) was employed to determine. Proportions were compared using the Chi-square test (x2). P-value 0.05 was considered statistically significant (S). It was judged highly significant (HS) when the P-value was 0.001 and non-significant (NS) when the P-value was >0.05.

RESULTS

The studied patients were 15 females (65.2%) and 8 males (34.8%), the mean age of all patients was 23.3 ± 2.67 years and ranged from (19—30) years. Only 7 patients had a negative family history (30.4%). Also,

the mean scar duration was 4.13±1.632 years and ranged from (1-7) years. Where Skin phototypes of patients distributed as follow; (8.7%) type (II), (56.5%) type (III) and (34.8%) type(IV). Sorting types of the atrophic lesion (65.2%) were rolling, (73.9%) icepick atrophic lesion, and (78.3%) were boxcar atrophic lesions. All patients were previously treated for atrophic acne scars **(Table 1).**

The Goodman and baron scale improvement significantly post-treated with Platelet Rich Plasma Gel Combined with micro-needling, where 69.6% of cases become grade1 post-treatment, drop grade3 to be (8.7%) post-treatment compared to (47.8%) pre-treatment the difference statistically significant p=0.022. Furthermore, all grade 4 fade out post-treatment p=0.008 **(Table 2).**

Fifteen patients showed very satisfying results (65.2 percent), 4 patients were satisfied (17.4 percent), three patients were of some sort satisfied (13 percent), and 1 patient was unsatisfied (4.3 percent). **(Figure 1)**

All patients had post-treatment erythema, (91.3%) swelling 65.2%) edema among patients treated with Platelet Rich Plasma Gel Combined with Microneedling **(Table 3).** There was no significant relationship between basic parameters of the studied group and clinical grading Goodman and baron scale post-treatment with micro-needling using Platelet Rich Plasma Gel **(Table 4)**

Table (1): Basic characters of studied patients (n=23):

	N	%
Age per years		
Mean ±SD (Range)	23.3 ± 2.67 (19—30)	
Sex		
Females	15	65.2
Males	8	34.8
Family history		
Negative	7	30.4
Positive	16	69.6
Clinical characteristics	N	%
Lesion duration per years		
Mean ±SD (Range)	4.13±1.632 (1--7)	
Skin phototypes		
II	2	8.7
III	13	56.5
IV	8	34.8
Types of atrophy		
Rolling	15	65.2
Icepick	17	73.9
Boxcar	18	78.3
Previous treatment		
Yes	23	100.0

Table (2): Clinical grading Goodman and baron scale pre and post-treatment with Combination of PRP Gel and Micro-needling (n=23):

Goodman and baron scale	Platelet Rich Plasma Gel Combined with Micro-needling				^{Mc} p
	Pre		Post		
	n.	%	n.	%	
Grade1	0	0.0	16	69.6	0.0001
Grade2	4	17.4	5	21.7	0.99
Grade3	11	47.8	2	8.7	0.022
Grade4	8	34.8	0	0.0	0.008

McNemar Test (S) P<0.05 significant

Table (3): Adverse effect of Platelet Rich Plasma Gel Combined with Micro-needling of studied patients (n=23):

	Platelet Rich Plasma Gel Combined with Micro-needling	
	N.	%
Erythema	23	100.0
Swelling	21	91.3
Edema	15	65.2
others	2	8.7

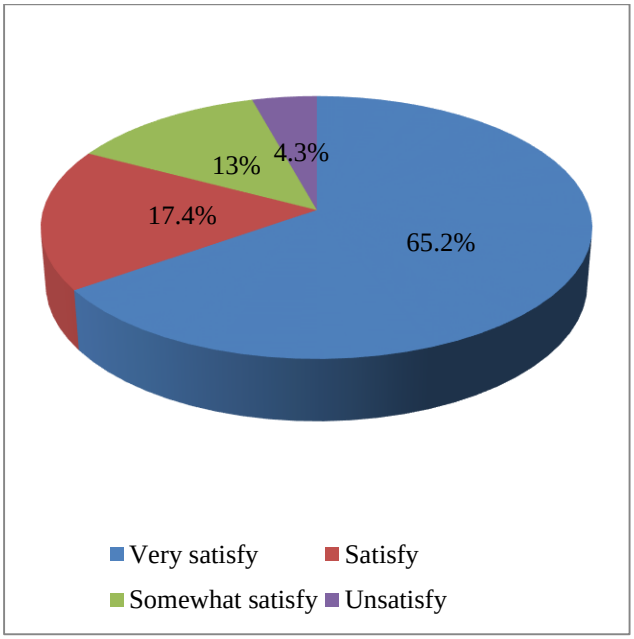
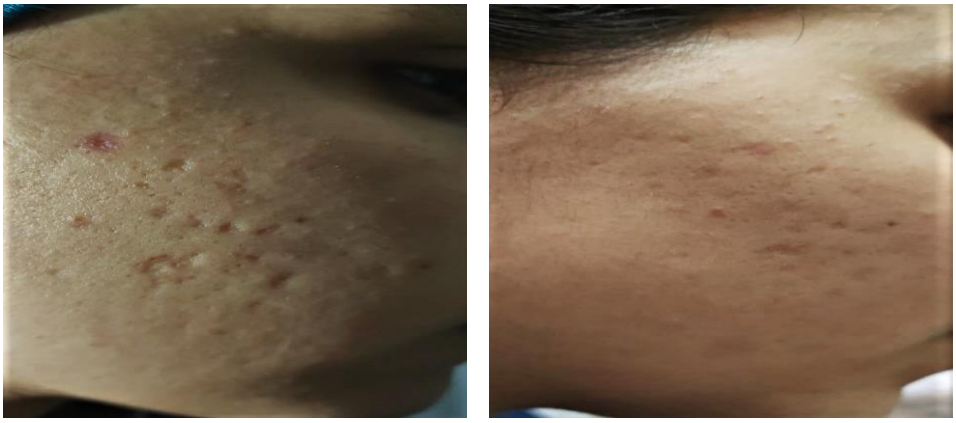


Figure 1: Patients' satisfaction regard Platelet Rich Plasma Gel (Combined with Micro-needling treatment) (n=23):

Table (4): Relation between basic parameters of studied groups and clinical grading baron, and Goodman scale post-treatment with Platelet Rich Plasma Gel Combined with Micro-needling:

Variables	Clinical grading Goodman and baron scale post-treatment with Platelet Rich Plasma Gel Combined with Micro-needling						χ^2	p-value
	Grade1 n.16		Grade2 n.5		Grade3 n.2			
	No.	%	No.	%	No.	%		
Age per years mean± SD	22.75±2.14		24.8±3.69		24±2.8		F=1.2	0.32
Sex								
Females	12	75.0	2	40.0	1	50.0	2.28	0.32
Males	4	25.0	3	60.0	1	50.0		
Family history								
Negative	6	37.5	1	20.0	0	0	1.15	0.47
Positive	10	62.5	4	80.0	2	100.0		
Duration of scar Mean± SD	3.75±1.69		4.6±0.89		6±1.4		4.02	0.13
Skin phototype								
II	2	12.5	0	0	0	0	1.13	0.89
III	9	56.3	3	60.0	1	50.0		
IV	5	31.3	2	40.0	1	50.0		
Family history								
Negative	6	37.5	1	20.0	0	0	1.15	0.47
Positive	10	62.5	4	80.0	2	100.0		
Types of the scar								
Rolling	9	56.3	4	80.0	2	100.0	2.1	0.35
Icepick	10	62.5	5	100.0	2	100.0	3.5	0.17
Boxcar	11	68.8	5	100.0	2	100.0	2.8	0.25
Complication								
Erythema	16	100.0	5	100.0	2	100.0		
Edema	10	62.5	4	80.0	1	50.0	0.74	0.69
Swelling	15	93.8	4	80.0	2	100.0	1.1	0.57
Other	2	12.5	0	.0	0	.0		
Patients' satisfaction								
Not satisfied	1	6.3	0	.0	1	50.0		
Satisfied	8	50.0	1	20.0	0	.0	12.2	0.058
Somewhat satisfied	3	18.7	4	80.0	1	50.0		
Very satisfied	4	25.0	0	.0	0	.0		



(A) **(B)**

Figure (2): A female patient 23 years old with atrophic acne scars: (A) face at baseline and (B) clinical appearance one month after the last session of plasma gel with micro-needling showing very good improvement.

DISCUSSION

It is estimated that up to 80% of adolescents are affected by acne. There is a chance of serious psychological repercussions from permanent acne scars because of the inflammatory damage around the hair follicle [(14)].

They were **Elfar and Hasby [(15)],** who worked with 60 patients who had atrophic post-acne scars. Twenty patients received intradermal injections of plasma gel, twenty patients received derma roller treatment, and twenty patients received both intradermal injections of plasma gel and derma roller treatment. After a month, the findings of patients treated with plasma gel and micro-needling showed that 30% had outstanding improvement, 0% had very good improvement, 20% had acceptable improvement, and 10% had poor improvement compared to our result of the face which treated with Plasma gel with micro-needling are higher than those results.

Our results of the face treated with Plasma gel with micro-needling are higher than those of **Nassar *et al.* [(16)]** who treated acne scars of 26 patients as First, the scars on both sides of the face were subtracted using a surgical blade. Injections of plasma gel and PRP were made on the right and the left side, respectively. The sessions were done monthly for 4 months**.** the results of the right side of the face which was treated by subcision with plasma gel regarding GAIS score were score 1(excellent improvement) was (38.5%), score 2(very good improvement) was (19.2%), score 3 (good improvement) was (15.4%) and score 4 (poor improvement) was (26.9%). our results of the face are , score 1 (60.9%) ,score 2 (21.7%) , score 3 (13.0%) and score 4 (4.3%).

In our study, the face treated with Plasma Gel combined with micro-needling had been improved after treatment as 69.6% of cases become grade1 after treatment. In addition, decline grade3 to be (8.7%) after treatment compared to (47.8%) before treatment the difference statistically significant p=0.022. Moreover, all grade4 improved after treatment p=0.008.

According to patient satisfaction, 65.2% of patients reported excellent satisfaction with the plasma gel with micro-needling while only 4.3% of patients reported poor satisfaction with that technique.

CONCLUSION

Dermapen combined with plasma gel or is a promising effective therapeutic modality for atrophic acne scars.

Financial support and sponsorship: Nil.
Conflict of interest: Nil.

REFERENCES

1. **Mazzetti A, Moro L, Gerloni M *et al.* (2019):** A Phase 2b, Randomized, Double-Blind Vehicle Controlled, Dose Escalation Study Evaluating Clascoterone 0.1%, 0.5%, and 1% Topical Cream in Subjects With Facial Acne Drugs. Dermatol., 18(6):56-59.
2. **Bhargava S, Cunha P, Lee J *et al.* (2018):** Acne scarring management: systematic review and evaluation of the evidence. Am J Clin Dermatol., 19: 459– 477.
3. **Fabbrocini G, Annunziata M, D'Arco V *et al.* (2010):** Acne Scars: pathogenesis, classification and treatment. Dermatol Res Pract., 10: 1–11.
4. **Kevy S, Jacobson M (2004):** Comparison of Methods for Point of Care Preparation of Autologous Platelet Gel. Journal of The American Society of Extra-corporeal Technology, 36:28–35.
5. **Amgar G, Christian B, Butnaru A *et al.* (2011):** Using Objective Criteria To Evaluate Cosmetic Effects Of Platelet Rich Plasma, Prime Journal, 11: 1-4.
6. **Aldecoa E (2014):** Formulation of a blood component that is rich in platelet and/or growth factors and contains gelled proteins, and a method for its preparation. Biotech Instit., 447: 5– 29.
7. **Nunez C, Ferrara G, Alcalde I *et al.* (2011):** Effectiveness of heated hematic derivatives (autologous serum & plasma rich in growth factors) in corneal epithelial wound healing. Invest Ophthalmol Vis Sci J., 98:22–52.
8. **Lee E, Falowski S (2018):** Platelet-rich plasma therapy: an overview. In: S Diwan, T Deer, eds. Advanced Procedures for Pain Management. Cham: Springer. Pp. 583– 594. https://link.springer.com/content/pdf/10.1007%2F978-3-319-68841-1.pdf
9. **Sharad J (2011):** Combination of micro-needling and glycolic acid peels the treatment of acne scars in dark skin. J Cosmetic Dermatol., 10:317-323.
10. **Goodman G (2000):** Post acne scarring: A Review of its pathophysiology and treatment. Dermatol Surg., 26: 857–871.
11. **Dhurat R, Sukesh M (2014).** Principles and Methods of Preparation of Platelet-Rich Plasma: A Review and Author's Perspective. Journal of Cutaneous and Aesthetic Surgery, 7(4): 189–197.
12. **Savoia A, Accardo C, Vannini F *et al.* (2014).** Outcomes in thread lift for facial rejuvenation: a study performed with happy lift™ revitalizing. Dermatology and Therapy, 4(1): 103–114.
13. **Ibrahim M, Ibrahim S, Salem A (2018);.** Skin micro-needling plus platelet-rich plasma versus skin micro-needling alone in the treatment of atrophic post-acne scars: a split-face comparative study. J Dermatol Treat., 29(3):281-286.
14. **Zhang M, Fang J, Wu Q *et al.* (2020):** Evaluation of the Safety and Efficacy of a Picosecond Alexandrite Laser With DLA for Acne Scars in Chinese Patients. Lasers in Surgery and Medicine, 52:176–181.
15. **Elfar N, Hasby E (2020):** Efficacy and safety of plasma gel as a new modality in the treatment of atrophic acne scars. International Journal of Dermatology,59(5): 620-626.
16. **Nassar A, EL-Shaarawy W, Salah E (2020)** Autologous plasma gel injection combined with scar subcision is a successful technique for atrophic post-acne scars: a split-face study, Journal of Dermatological Treatment, 20: 1-7.