International Journal of Research in Dermatology
Babu AM et al. Int J Res Dermatol. 2019 May;5(2):254-258
http://www.ijord.com

DOI: http://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20191760

Original Research Article

A comparative study of efficacy and safety of platelet rich plasma versus fractional co_2 laser in the treatment of post acne scars

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Received: 17 December 2018
Accepted: 06 February 2019

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ABSTRACT

Background: Facial scars prompt restorative issues and have mental impacts, for example, humiliation, poor confidence, and social isolation. This study intends to assess efficacy and safety of platelet rich plasma (PRP) versus CO_2 laser in post acne scar treatment.
Methods: It is an outpatient based comparative study. All patients enlisted in this study were separated into two groups, ten in each treatment group. In group A, patients received PRP month to month for 3 sittings and followed up eight weeks after the third sitting. In group B, patients received fractional CO_2 laser month to month for 3 sittings and followed up eight weeks after the third sitting. Improvement of acne scars was assessed utilizing digital photographs with identical camera settings and Goodman and Baron's qualitative grading system at beginning, after each sitting and followed up eight weeks after the third sitting. Patients subjectively evaluated clinical improvement eight weeks after the last sitting. Software (SPSS, version 16.0 statistical packages) was used.
Results: Assessment using qualitative acne scars grading system prior to and after treatment as well as patient's subjective assessment 2 months after the third treatment session showed significant improvement in both groups. The baseline scores before treatment for group A and B were similar (p=0.7678) and final scores of both treatment groups showed no significant difference (p=0.8011) after treatment.
Conclusions: This study shows that PRP as well as fractional CO_2 laser result in significant clinical change in the quality of post acne scars.

Keywords: Acne scars, PRP, Fractional CO_2 laser

INTRODUCTION

Acne vulgaris is a common inflammatory disorder of pilosebaceous unit affecting teenagers and young adults which can lead to frequently troubling and hard to treat scars.[1] Facial scars prompt restorative issues and have mental impacts, for example, humiliation, poor confidence, and social isolation.[2]

Atrophic acne scars are of three types-ice pick, rolling and boxcar type.[3] Goodman and Baron scale: grade 1 corresponds to macular disease, with erythematous macules, which may be hyperpigmented and hypopigmented; grade 2 is characterized by atrophic and hypertrophic scars that are scarcely visible and simple to cover with cosmetics; In grade 3, atrophic and hypertrophic scars are more obvious and not effectively disguised by cosmetics, however they become subtle with distension of the skin; The most serious picture is seen in grade 4, in which scars cannot be easily concealed.[4]

Autologous platelet-rich plasma (PRP) has an elevated platelet concentration (4-7 times) above baseline in a small volume of plasma.[5] PRP initiates mild inflammation, which stimulates healing process and generation of growth factors that lead to new vessels formation for tissue regeneration.[6]

Fractional CO_2 laser as monotherapy has been an established treatment option for scar correction.[7,8] The clinical change in acne scars following fractional CO_2 laser is due to the combination of processes of healing that initiates new collagen deposition after ablation (vertical effect) and collagen remodeling initiated by zone of coagulation surrounding the ablated area (horizontal effect).[9]

Aims and objectives were to compare the efficacy and safety of PRP versus fractional CO_2 laser in the treatment of post acne scars and to perform subjective evaluation and assess clinical improvement based on photographic documentation.

METHODS

This outpatient based comparative study was conducted at dermatology department of tertiary hospital in Mangalore from March 2018 to August 2018. Sample size of this study was 20, with ten cases of post acne scars in each treatment group. This present study was approved by our institutional ethical committee.

Adult males and females between 18 and 45 years of age with post acne scars and who gave informed written consent were included in this study. Patients with active acne, keloids/family history of keloids, active herpes infection, diabetes or hypertension, platelet dysfunction syndrome, HIV, HBV, carcinomas, photosensitivity, pregnant mothers and on isotretinoin in the past one year were excluded from the present study.

In group A, patients received platelet rich plasma monthly for 3 sittings and followed up eight weeks after the third sitting. PRP preparation: a two-stage centrifuging process was performed to obtain PRP. Under aseptic conditions patient's venous blood was withdrawn and transferred to vacutainers containing an anticoagulant. It was centrifuged at 1500 rpm for ten minutes using REMI R-8 C laboratory centrifuge device. The soft spin isolated platelet-poor plasma (PPP) from red blood cells (RBCs) and PRP. The PPP, PRP and a few RBCs were withdrawn into fresh vacutainers and centrifuged at 3000 rpm for twenty minutes. Following hard spin, PRP which collected at the base of the tube was withdrawn.[10] 45 minutes prior to the procedure, the treatment area was cleaned utilizing acetone and topical anesthetic cream was applied under occlusion. PRP was injected into each scar intradermally. Following each sitting, patient was instructed to apply sunscreen and moisturizer regularly and to keep away from sun exposure and rubbing over areas of PRP application.

In group B, patients received fractional CO_2 laser (unit: fractional CO_2 laser, dermaindia; Chennai, Tamil Nadu) with a pulse energy of 30-70 mJ, with energy repeat 2, dot space 2 mm in static mode monthly for 3 sittings and followed up eight weeks after the third sitting. 45 minutes prior to the procedure the treatment area was cleaned utilizing acetone and topical anesthetic cream was applied under occlusion. Following every sitting, patient was instructed to apply sunscreen and moisturizer regularly and to keep away from sun exposure and rubbing over areas of treatment.

Clinical improvement of scars was evaluated utilizing digital photographs with identical camera settings and qualitative acne scarring grading system at beginning, following every sitting and followed up eight weeks after the third sitting.[4] Patients subjectively assessed clinical improvement eight weeks after the final sitting. A score of 0, 1, 2 and 3 was thus given if the response was <25%, 25-50%, 51-75% and >75%, respectively. The improvement was graded as excellent if the score was two or more and good if the score obtained was one. "Poor" responders were those with a score of less than one.[11]

Statistical analysis

Software (SPSS, version 16.0 statistical package) was used throughout. Continuous variables were evaluated using mean and standard deviation. P value was considered significant if it was <0.05.

RESULTS

All twenty patients completed three sittings. There were 13 males and 7 females in this present study. The mean age of the subjects was 27.05±5.28 years (Table 1).

Table 1: Patients demographic data.

Characteristics	Men	Women	Age (years)	
			18-30	31-45
Number	13	7	14	6

Assessment using qualitative acne scars grading system prior to and after treatment showed significant improvement in both groups. For group A patients, the mean baseline score was 3.27±0.25 and mean final score was 2.87±0.48 showing a statistically significant difference (p=0.0312) between the baseline and final scores. For group B patients the mean baseline score was 3.31±0.34 and mean final score was 2.92±0.39 and the difference between the baseline and final scores was statistically significant (p=0.0284). The baseline scores before treatment for group A and B were similar (p=0.7678) and the final scores of both treatment groups showed no significant difference (p=0.8011) after treatment (Table 2).

Table 2: Assessment of improvement based on Goodman and Baron's qualitative global acne scarring grading system.

Group	Baseline (mean±SD)	2 months after third treatment session (mean±SD)
(A) PRP	3.27±0.25	2.87±0.48
(B) CO_2 laser	3.31±0.34	2.92±0.39

Figure 1: PRP; (A) at baseline; (B) after second session; (C) after third session; (D) two months after third session.

Figure 2: Fractional CO2 laser; (A) at baseline; (C) after third session; (D) two months after third session.

On patient's subjective evaluation eight weeks after the third sitting, in group A, an excellent response was observed in 7 patients (70%), a good response in 2 patients (20%) while 1 patient (10%) was a "poor" responder. In group B, an excellent response was seen in 5 patients (50%) while 3 (30%) and 2 patients (20%) showed a good and poor response respectively (Table 3).

Side effects reported by group A patients included mild pain, erythema and swelling whereas group B patients reported post session transient erythema.

Table 3: Patient's subjective assessment 2 months after the third treatment session.

Score	Platelet rich plasma (n=10)		Fractional CO_2 laser (n=10)	
	N	%	N	%
0 (<25%)	1	10	2	20
1 (25-50%)	2	20	3	30
2 (51-75%)	4	40	3	30
3 (>75%)	3	30	2	20
Total	10	100	10	100

DISCUSSION

Acne has a prevalence of over 90% among adolescents with mental and social implications.[3]

The hypothetical mechanism of PRP in the reconstruction of an atrophic scar is through various growth factors necessary for tissue remodeling, which promote connective tissue regeneration by up regulating collagen and protein production.[12]

Hypothetically, the mode of action of laser resurfacing incorporate tissue removal, prompt collagen shrinkage, and remodeling of dermal collagen. Columns of miniscule ablated epidermis and dermis after treatment with CO_2 laser may lead to visible epidermal healing as confirmed by clinical improvement of scar and skin texture.[13]

The male to female ratio in this study was 13:7 with more number of subjects in the age group of 18-30 years which could be attributed to subjects in the younger age group being more conscious about their appearance.

Zhu et al used erbium laser with PRP in 22 patients with acne scar and reported excellent clinical improvement and patient satisfaction on the PRP-treated patients.[10]

Lee et al carried out a study on 14 patients with acne scars and treated them with two sittings of CO_2 laser on whole face, and one side of the face was given intradermal PRP and the other side intradermal saline that was randomly selected.[14] The clinical improvement was reported to be better on the PRP-treated site on a quartile grading scale.

In Asian patients, Sung Bin Cho and co-workers demonstrated the efficacy as well as safety of CO_2 laser in acne scars. Half of the 20 patients enrolled in this study achieved clinical improvement of >50% while another 7 patients achieved 26-50% improvement. The mean post-treatment erythema and crusting lasted for 2.8±4.6 days and 6.3±3.0 days, respectively.[15] In a single-blinded randomized study on acne scars, Hedelund et al demonstrated significant improvement in skin texture and atrophy in comparison with placebo after 3 monthly laser sessions with fractional CO_2 device. The study was conducted on 13 patients and the patients were also quoted as being 'satisfied' with the treatment option. Relatively higher energies in the range of 48-56 mJ with a treatment density of 13% were used in this study.[16]

In our study, a statistically significant improvement in the qualitative scoring of acne scars was demonstrated in both groups before and after treatment. There was no statistical significance between the mean baseline and final scores between both groups at the start of and after treatment respectively.

CONCLUSION

This study shows that PRP as well as fractional CO_2 laser result in significant improvement in the quality of post acne scars. The principle points of interest of PRP are that it prohibits the conceivable outcomes of treatment dismissal and the need for a contributor, and in addition any transmissible contamination as it is an autologous product, and it is a cost effective treatment.[10]

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Babu AM, Shetty VH, Goel S, Eram H. A comparative study of efficacy and safety of platelet rich plasma versus fractional co2 laser in the treatment of post acne scars. Int J Res Dermatol 2019;5:254-8.