

Original paper**A SPLIT FACE COMPARATIVE STUDY OF MICRONEEDLING WITH PLATELET RICH PLASMA VERSUS FRACTIONAL CO₂ LASER WITH PLATELET RICH PLASMA IN MANAGEMENT OF ATROPHIC ACNE SCARS**

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Abstract:

Introduction: Acne scars, a disfiguring malady is a challenge for dermatologists, despite having multiple treatment modalities like subcision, microneedling, dermabrasion, TCA CROSS, Fractional CO₂ Laser, dermal fillers, etc. However, monotherapy has been hardly satisfactory because of the polymorphism seen with the scars. Platelet Rich Plasma (the autologous plasma with high concentration of platelets) has been versatile since its advent. It has been revolutionary in the management of acne scars by providing numerous growth factors aiding in scar remodelling along with time proven methods.

Materials & Methods: A prospective analytical study was conducted over a period of 6 months including 26 patients. Each patient received microneedling plus PRP on right side of the face while Fractional CO₂ Laser plus PRP on the left side simultaneously for total 6 such sittings at 21 days interval. Response was noted with serial photographs and goodman's qualitative and quantitative scores. Autologous PRP was prepared with double spin method to yield uniformly high amount of platelets.

Results: Out of 26 patients enrolled in the study, none of the patient reported a poor response which means both the modalities are effective. The Average Qualitative score, pre and post treatment showed significant difference with 10 patients showing excellent results in Fractional CO₂ Laser treated side.

Conclusion: Fractional CO₂ Laser is a non invasive procedure with PRP boosting the end results in acne scar treatment, hence should be considered one of the first line treatments.

Key words: Acne Scars, Microneedling, Fractional CO₂ Laser, PRP

INTRODUCTION: Acne Vulgaris, the most prevalent disease among the adolescents, leaves its impact on the face with disfiguring scars. This leads to tremendous effect on one's self esteem and to a certain extent, causes depression considering current aesthetic era where everyone wants to look more youthful and appealing, which imparts an added pressure on the treating dermatologists. It is presumed that Acne affects 90 % of the population at some

point in their lifetime and owing to its inflammatory nature; it leads to scarring later on (1). Acne scars are formed when the inflammatory process of acne extends deep into the dermis and replaces the normal tissue with the fibrous one (2). Acne scars are divided into three basic types being Macular, Atrophic & Hypertrophic, out of which Atrophic scars are most common. They are further subdivided into Ice pick, Boxcar, Rolling, Linear and Lipo-atrophic scars (3). Though multiple treatment options (e.g. subcision, TCA CROSS, chemical peeling, microneedling, Lasers, Mesotherapy, excision and grafting, dermabrasion) are available to treat the acne scars, none as a monotherapy has proven satisfactory. However, Autologous Platelet Rich Plasma has emerged as a new add on therapy which helps in tissue remodelling when combined with other conventional modalities as it provides high number of growth factors (14).

MATERIALS & METHODS: Over a period of 6 months, from February 2019 to July 2019, a prospective analytical study was conducted after Institutional Review Board Approval, at a tertiary care hospital. 30 patients attending the dermatology OPD regarding the acne scar concerns were included in the study using purposive sampling technique. As Microneedling and Fractional CO₂ laser both target Boxcar and Rolling type of acne scars, patients with majority of these type of scars were included in the study. Patients were evaluated with standard Goodman & Baron's Qualitative and Quantitative Scores. Each Patient with equal amount of score on both the half of the face was included in the study. Those with history of Keloidal Tendencies, active infections (acne, herpes), Bleeding diathesis, immunocompromised, pregnant and lactating mothers were excluded from the study. Out of 30 enrolled patients, 26 completed the study. After obtaining written & informed consent form, a split face treatment was done. Each patient was given Topical Anesthesia i.e. Eutectic mixture of Local Anesthesia cream under occlusion for one hour. Then Right side of face was treated with Microneedling using a standard Dermaroller with needle length of 1.5 mm and 540 numbers of needles. The Dermaroller was rolled in horizontal, vertical and diagonal directions till pinpoint bleeding was visible which marked the endpoint of the treatment (7) (10). Simultaneously left side of face was treated with a fractional CO₂ Laser, wavelength of the laser being 10,600 nm and energy set at 15 mJ with single stacking (12) (13). 10 ml of blood was obtained from each patient and was first centrifuged at 1300 rpm for 15 minutes. The separated plasma along with upper 1 mm layer of RBCs was aspirated and again centrifuged at 1600 rpm for 15 minutes which yielded approximately 1 ml of platelet rich plasma and 7 ml of Platelet Poor Plasma (PPP). This PRP was then injected with an insulin syringe on the treated areas on both the halves of the face in a dose of 0.01 ml per sq.cm area (14). PPP was sprinkled over face to cover the entire treated area and occluded with sterile gauzes for 30 minutes. Post procedure, every patient was advised strict photoprotective measures daily along with antibiotic cream and mild topical steroid to be applied twice a day for 5 days. Total 6 such sittings were performed at an interval of 21 days. Response was noted with pre and post treatment Photographic evaluation, Patient satisfaction score and Goodman & Baron's Qualitative(5) and Quantitative scores(4).

RESULTS: Out of 30 patients enrolled in the study, only 26 patients completed the treatment protocol. None of the patient reported a poor response i.e. No improvement, which means both the modalities are effective (Figure 3) (Table 4 -5). The most widely accepted Goodman & Baron’s Score for acne scars was used to compare the level of improvement. Excellent response was considered as an improvement by two grades upgradation while Good Response as an upgradation of one grade in Goodman & Baron’s Qualitative score. The Average Qualitative score, pre and post treatment showed significant difference with 10 patients showing excellent results in Fractional CO₂ Laser treated side i.e. Improvement by two grades upgradation compared to only 4 patients reporting the same response on Microneedling treated side(Figure-1) (Table-2). Likewise on Quantitative Score 57 % patients reported better response on Fractional CO₂ Laser treated side compared to only 43 % with Microneedling treated side (Figure-2) (Table-3). On Patient Satisfaction score Average improvement score obtained for the left side was 6.35 out of 10 which is higher than that obtained from the Right side i.e. 5.15 out of 10 (Figure 3) (Table 4 -5). Unpaired t test was performed and used to compare the two obtained results on all 3 Criteria, data was found to be statistically significant (P value <0.05). Minimal side effects noted were Persistent Erythema, Post inflammatory Hyperpigmentation and Acne flare which responded to standard treatments respectively.

Table 1: Demographic Profile of the Patients

Demographic Profile (n= 26)		
Sex	Male	16
	Female	10
Age Groups	18-25	14
	26-33	9
	34-40	3
Mean Age	25.18	

Figure 1: Goodman & Baorn's Qualitative score- Improvement in grades

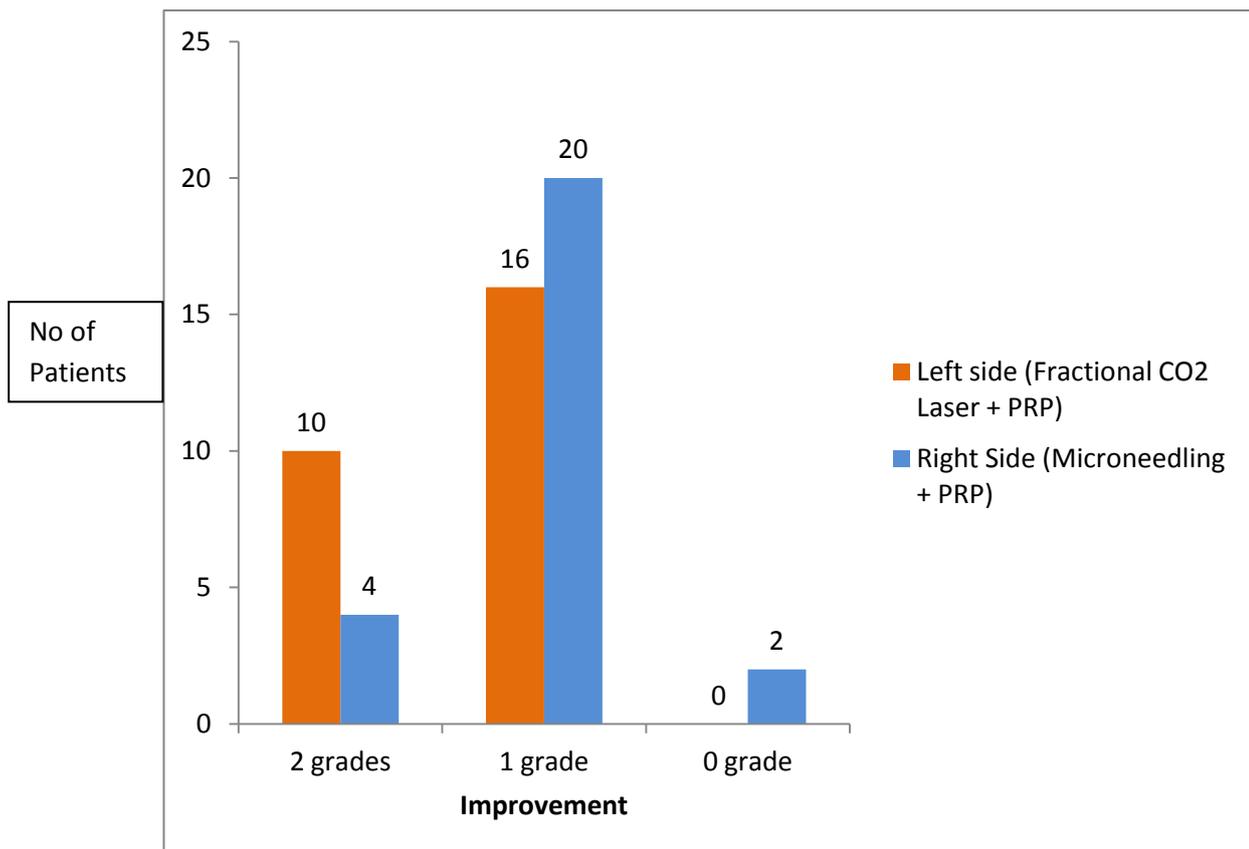


Table 2: Goodman & Baron's Qualitative Score- Improvement

Mean Score	Right Side (Microneedling + PRP)	Left Side (Fractional CO ₂ Laser + PRP)
Before Treatment	3.35	3.35
After Treatment	2.27	1.96
Difference	1.08	1.38
Standard Deviation	0.49	0.47
Unpaired t test Value: 2.3094		
P Value : 0.0251 (data Statistically significant)		

Figure 2: Percentage of Improvement in Goodman & Baron's Quantitative Score

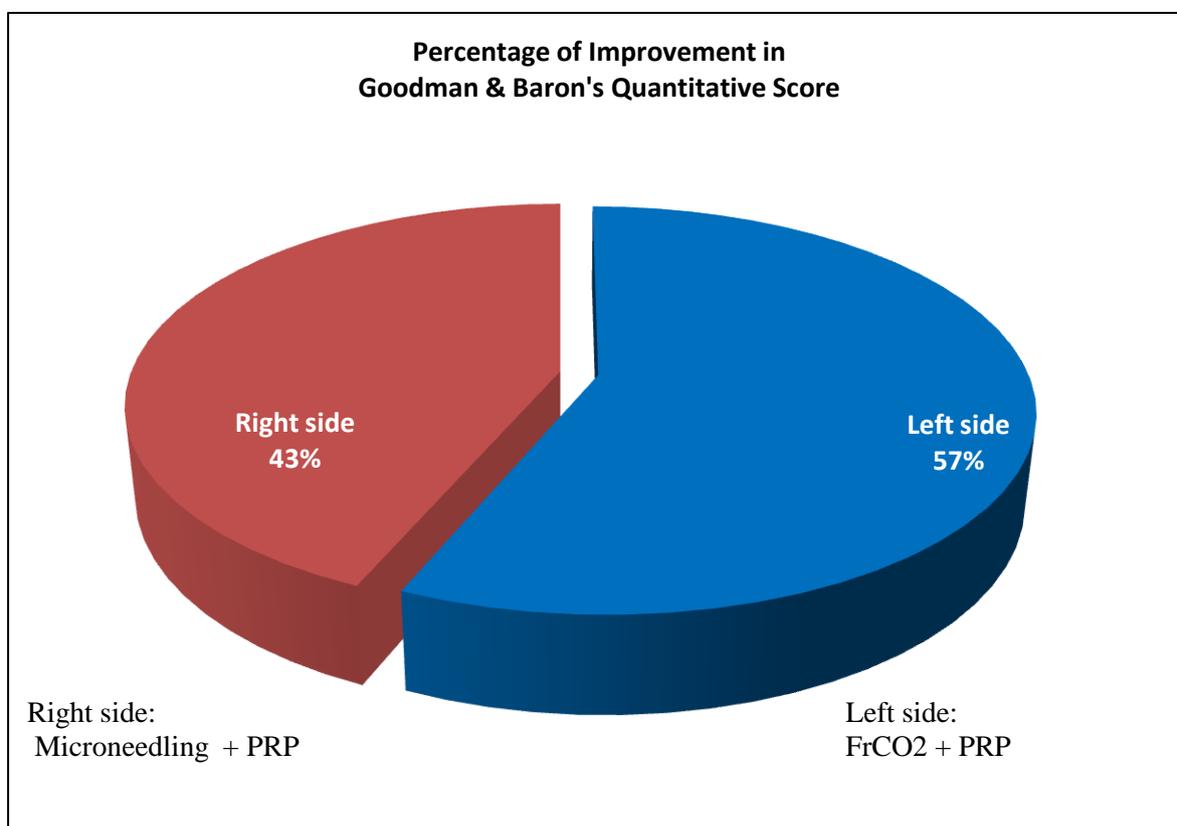


Table 3: Goodman & Baron's Quantitative score Improvement		
Mean Score	Right Side (Microneedling + PRP)	Left Side (Fr CO2 + PRP)
Before Treatment	15.23	15.38
After Treatment	12.04	11.29
Difference	3.19	4.19
Standard Deviation	0.47	0.42
Unpaired t test value: 2.2576		
P value : 0.0284 (data statistically significant)		

Figure 3: Comparison of 10 point Patient Satisfaction Score

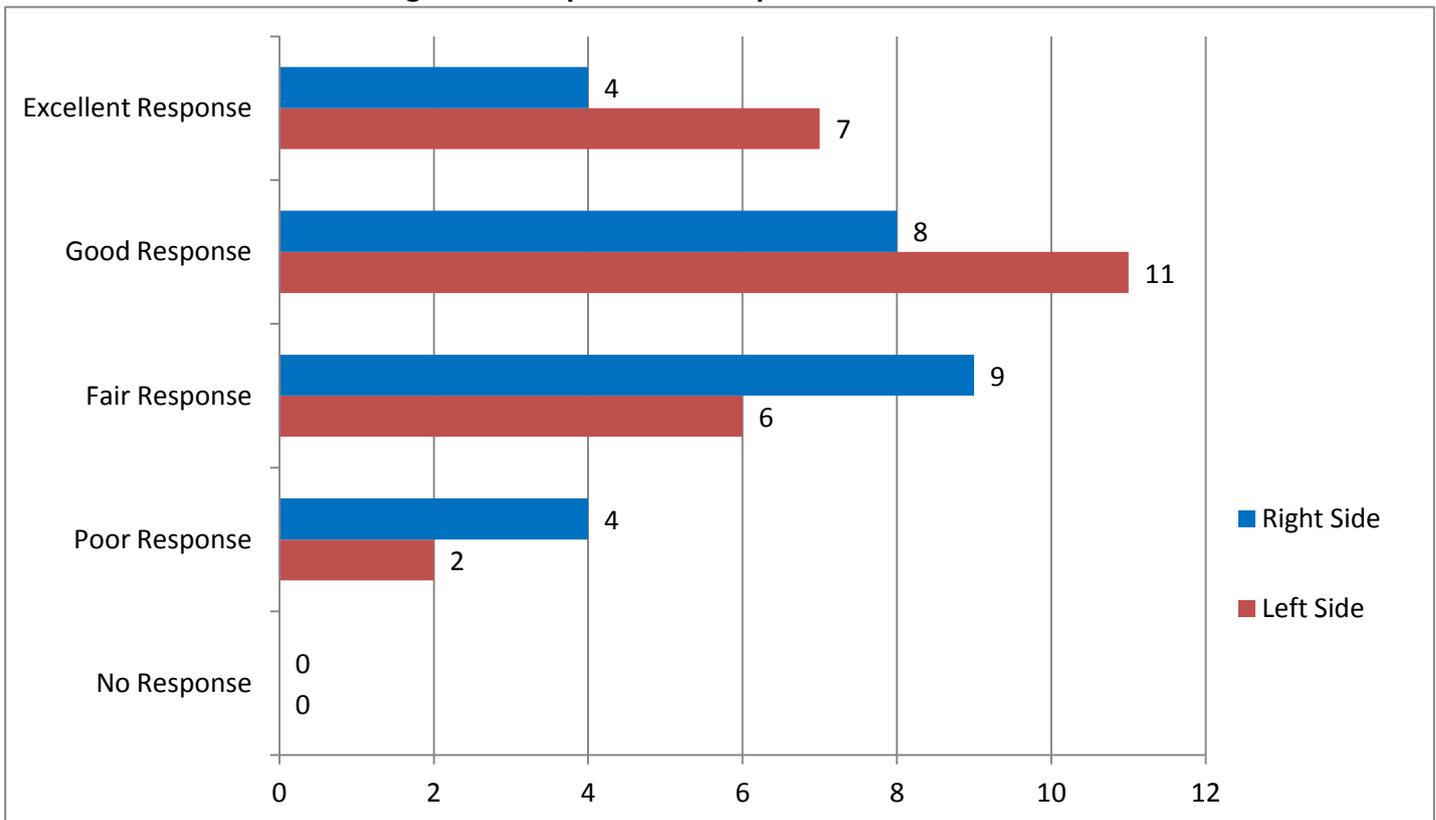


Table 5: Calculated Patient Satisfaction score

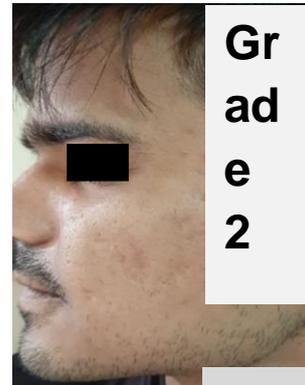
	Right side	Left side
Mean Score	5.15	6.35
Standard Deviation	2.14	1.92
Unpaired t test value: 2.3094		
P value: 0.0251		

Table 4: Standard 10 point Patient Satisfaction score	
Score	Response
0	No Response
1-3	Poor Response
4-5	Fair Response
6-7	Good Response
8-10	Excellent Response

LEFT
SIDE

(
Fract
al CO
Laser
RIGHT
SIDE
+ PRP)

(
Microne
edling
+ PRP)



Pre
Treatn



Post
Treatment

LEFT
SIDE



(
Fracti
CO2
Laser
RIGHT
SIDE
+ PRP)



(
Microne
edling
+ PRP)

Pre Treatment

Grade 4

Grade 3

Post Treatment

Grade 2

Discussion: Microneedling and Fractional CO₂ laser are few of the very easy outpatient procedures that are reasonably effective. Microneedling acts by causing collagen induction in atrophic scars by making multiple micro puncture wounds which heal with better appearance of the scars (6). Similarly Fractional CO₂ Laser causes collagen remodelling by creating microthermal zones. The surrounding tissue helps in regeneration process via repair cascade (11). However the recent addition in armamentarium for acne scar management, PRP has revolutionized the treatment as it provides multiple Growth factors like Platelet Derived Growth Factors, Transforming Growth factors, Vascular Endothelial Growth factor, Fibroblast Growth Factor, Platelet Derived Angiogenesis factor etc and cytokines which not only hasten the healing process of micro injury caused by the other methods but also reduces the side effects caused by them (14). In our study, no major adverse events were observed. Being one of its first kinds, this split face study provides a better comparison of the two modalities in the same patient. A split face study done by Asif et al (9), who compared microneedling with PRP on one side of face and Microneedling with distilled water on the other side showed that PRP treated side showed better improvement with lesser side effects. Similarly another split face study done by Abdel et al (12), who compared Fractional CO₂ laser with PRP on one side of the face to only Fractional CO₂ laser on the other side which also showed better response with PRP treated side, suggesting significant role of PRP in management of acne scars. However, to our best knowledge, there are no split face studies comparing Microneedling to Fractional CO₂ laser combined with PRP are available. In our study, both the modalities have proved to be effective individually, but when compared with each other Fractional CO₂ laser with PRP showed better results.

Limitations: The sample size of the study is small due to the attrition effect. Patient satisfaction score can pose interobserver bias.

Conclusion: Fractional CO₂ Laser is a safe, effective, non invasive, simple office procedure for atrophic acne scar management especially when combined with PRP & hence should be considered one of the first line of treatments.

Abbreviations: PRP- Platelet Rich Plasma, PPP- Platelet Poor Plasma, FrCO₂- Fractional CO₂ Laser,

REFERENCES:

1. Burton JL, Culiffe WJ, Stafford I, et al. The prevalence of acne vulgaris in adolescence. *Br J Dermatol.* 1971; 136: 166-71
2. Fabrocini G, Annunziata MC, D'Arco V, De vita V, Lodi G, Mauriello MC, et al. Acne scars: pathogenesis, classification and treatment. *Dermatol Res Pract.* 2010:893080
3. 3 Jacob CI, Dover JS, Kaminer MS, Acne scarring: A classification system and review of treatment options. *J Am Acad Dermatol.* 2001;45:109-17
4. Goodman GJ, Baron JA. Postacne scarring—a quantitative global scarring grading system. *J Cosmet Dermatol.* 2006;5:48-52.
5. Goodman GJ, Baron JA. Postacne scarring: a qualitative global scarring grading system. *Dermatol Surg.* 2006;32:1458-1466.
6. Dogra S, Yadav S, Sarangal R. Microneedling for acne scars in Asian skin type: an effective low cost treatment modality. *J Cosmet Dermatol.* 2014;13:180-187
7. Fabbrocini G, De Vita V, Pastore F, et al. Combined use of skin needling and platelet-rich plasma in acne scarring treatment. *Cosmet Dermatol.* 2011;24:177-183
8. 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;7:209-212.
9. Asif M, Kanodia S, Singh K. Combined autologous platelet-rich plasma with microneedling verses microneedling with distilled water in the treatment of atrophic acne scars: a concurrent split-face study. *J Cosmet Dermatol.* 2016;15:434-443.
10. 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;29:281-286.
11. Lee JW, Kim BJ, Kim MN, et al. 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
12. Abdel Aal AM, Ibrahim IM, Sami NA, et al. Evaluation of autologous platelet rich plasma plus ablative carbon dioxide fractional laser in the treatment of acne scars. *J Cosmet Laser Ther.* 2018;20:106-113.
13. Min S, Yoon JY, Park SY, et al. Combination of platelet rich plasma in fractional carbon dioxide laser treatment increased clinical efficacy of for acne scar by

enhancement of collagen production and modulation of laser-induced inflammation.
Lasers Surg Med. 2018;50:302-310.

14. Savant s, Chap 93 Platelet rich Plasma 1108-1125,Textbook of Dermatosurgery & Cosmetology principles and practice, Third edition, 2018 bhalani publishing house

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