Evaluation of autologous platelet-rich plasma plus ablative carbon dioxide fractional laser in the treatment of acne scars

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ABSTRACT

Introduction: Acne scar is a common distressing complication of acne vulgaris. CO₂ laser resurfacing proved effective for the treatment of this problem, but the associated complications may limit its use. Platelet-rich plasma (PRP) may increase the chance of favorable outcome. Aim of the work: To evaluate the synergistic effects of autologous PRP with fractional CO₂ laser resurfacing in the treatment of acne scars among Egyptian patients. Patients and method: This study included 30 patients suffering from post-acne scars. CO₂ laser treatment was applied to both sides of the face followed by PRP injection for the right side. Evaluation was carried out through operating physicians, two blinded physicians as well as through patient’s satisfaction. Result: The right side of the face (PRP-treated side) achieved excellent improvement in 13.3% of the patients, while there was no excellent improvement on the left side. Conclusion: Combination of fractional CO₂ laser resurfacing and intradermal PRP was superior to CO₂ laser alone for acne scar treatment.

Introduction

Acne is a common condition that affects up to 80% of the adolescent population. Permanent scarring is an unfortunate complication due to abnormal resolution following the damage that occurs in the sebaceous follicle during acne inflammation (1). Early treatment of inflammatory acne lesions may be beneficial in preventing acne scarring, but many patients still present with troubling noticeable scars (2). Acne scars are a consequence of inflammatory damage around the hair follicle (3). It can be classified into three different types: atrophic, hypertrophic, or keloidal (1). Atrophic scars are by far the most common type (4), which can also be classified based on the width, depth, and three-dimensional architecture into icepick, rolling, and boxcar scars. Different quantitative and grading system was also proposed. Goodman and Baron (2006) presented quantitative scoring based on the number, type of scar (atrophic, macular, boxcar, hypertrophic, and keloidal), and severity (mild, moderate, and severe) (5). They also added a Qualitative Global Grading System, which was a simplified one (6). Global Scarring Score (GSS) takes into account the form, intensity, type, and evolution period of the scars (7). Despite the documented efficacy of fractional CO₂ laser resurfacing in the treatment of acne scars, its drawbacks such as long periods of erythema and edema may cause discomfort and hinders patient’s daily activities. Furthermore, recent reports have highlighted the potential risks associated with the use of ablative fractional lasers, especially in patients with darker skin phototypes (8). Platelet-rich plasma (PRP) is an autologous concentration of human platelets in a small volume of plasma. It contains growth factors, especially epidermal growth factor, platelet-derived growth factor, transforming growth factor beta, and vascular endothelial growth factor (9). These factors are known to regulate various processes including cell migration, attachment, proliferation, and differentiation, and to promote extracellular matrix production by binding to specific cell surface receptors (8). PRP has been used in many fields of medicine and surgery to promote wound healing and accelerate the formation of newly formed tissue in addition to the cosmetic applications in the rejuvenation and treatment of hair disorders (10).

Redaelli et al. noticed improvement of acne scars by PRP intradermal injection while using PRP for skin rejuvenation (11). Lee and colleagues combined fractional CO₂ laser with PRP in treating acne scars, and they concluded that PRP enhanced the recovery of laser-damaged skin (12).

Aim of the work

In this study, we aim to evaluate the synergistic effects of autologous PRP with fractional CO₂ laser resurfacing in the treatment of acne scars among Egyptian patients.

Patients and methods

This study was designed as a single-blinded, comparative split-face applying fractional CO₂ laser alone for the left side and using a combination of CO₂ laser with PRP for the
treatment of acne scars on the right side. Thirty patients with different types of acne scars were enrolled in this study.

Exclusion criteria included history of keloidal scar formation, any active inflammation or infection, oral isotretinoin use within the preceding 6 months, diabetes mellitus, collagen vascular disease, pregnancy and lactation, photosensitivity or current use of photosensitive drugs, melasma, known allergy to lidocaine, blood coagulopathy or medications that affect blood coagulation, or with wound healing as well as those on immunosuppressive drugs. Radiofrequency or laser treatment should be stopped six months before the study. Written informed consent was obtained from each patient before enrollment in the study. History was taken including patient’s age, duration of acne scars, recent systemic therapy with isotretinoin, or previous procedures to repair acne scars. Systemic prophylactic antiviral therapy (Acyclovir) was given to patients with a known history of recurrent herpes simplex. General dermatologic examination for any associated skin disease was also carried out.

Clinical examinations of post-acne scars were performed with a magnifying lens, under good illumination, while the patient was sitting in an upright position, to detect the type of each lesion. Grading of post-acne scars’ severity was performed using the Qualitative Global Grading system of Goodman and Baroo (6).

Treatment protocol

All subjects received two sessions of laser treatment with three to four weeks of interval between the sessions. Patients were followed up at 6 months after the final session.

Laser treatment

Each participant’s lesions on both sides of the face were treated with an ablative CO2 fractional laser (10600 nm) (Smartxide DOT, advanced CO2 fractional technology, Deka, Florence, Italy), and then only the right side received autologous PRP injection after each laser session.

Preparation of PRP

Blood sample (10 ml) was obtained by venipuncture of the median cubital forearm vein using a 21-gauge butterfly needle and then collected in special five sterile vacutainer tubes containing an anticoagulant Na Citrate 3.8%. Each tube was centrifuged at 3000 rounds per minute (rpm) for 7 minutes at room temperature in order to separate red blood cells from plasma, which contains “buffy coat” (white blood cells and platelets). The plasma and buffy coat were gently aspirated from each tube and transferred to a second tube (plain tube without anticoagulant). Further centrifugation was carried out at 4000 rpm for 5 minutes at room temperature, thus obtaining a two-part plasma: the uppermost part, consisting of platelet-poor plasma (PPP), and the lower part, consisting of PRP. The PPP was first gently aspirated and discarded, to avoid its mixing with the PRP. The residual PRP was subsequently aspirated and prepared for activation by calcium chloride at the proportion of 0.1 ml of CaCl2 per 0.9 ml of PRP, thus obtaining a concentration of activated PRP (1 ml). Approximately 2 ml of PRP was produced; this activated PRP was then injected intradermally through a 30-gauge needle.

Preoperative care

Local anesthetic (EMLA) cream was applied to the treated area under occlusion for 60 minutes before the procedures. Then the whole face was cleansed using a mild cleanser and dried with sterile gauze.

Technique

We used the following laser parameters for treatment: 15 watt, 600 µs dwell time, with spacing of 700 µm, and smart stack level 3. Fine adjustment of the parameters according to skin type and patient’s reactions was performed. Ice packs were used to minimize heat and pain during and after the procedure. Later, the right sides of the face received an intradermal injection of autologous PRP in the treated lesional scars. Injection was administered under sterile conditions, 0.1 ml at each point with 1–1.5 cm apart; then the patients were instructed to apply pressure using sterile gauze for approximately 15 minutes.

Postoperative care

During first week post treatment, all patients were instructed to use mild facial cleanser every 4 hours followed by emollient application. Direct sun exposure, heat, and friction were to be avoided. Sunscreen was applied daily with at least SPF 30.

Outcome assessments

Patients were evaluated at 3 days, 7 days, 1 month, and 3 months after sessions to assess the response to each individual laser treatment and also at the end of the follow-up period (6 months after the final laser session). Standardized high-resolution digital photographs using identical camera settings, patient positioning, and lighting conditions were obtained prior to laser treatments, after 3 days, 7 days, 1 month, 3 months, and by the end of the follow-up period. The follow-up photographs were randomly presented for comparison with the known baseline photograph. This was performed through the assessment of two non-treating blinded physicians. The physicians were independent in that they did not participate in the study and did not know the treatment protocol. They were asked to rate the degree of improvement in the quality of skin texture, number, size, and depth of the lesions using the quartile grading scale of Tanzi & Alster (13). The degree of facial erythema was evaluated one week after the session through the Clinician Erythema Assessment Scale (CEA), which was graded as clear, almost clear, mild, and moderate (14). Other adverse effects including post-inflammatory hyper- or hypopigmentation, edema, acniform eruption, bleeding, blistering, petechiae, infection, and scarring were recorded as absent or present. The patients also filled out a questionnaire for subjective assessment of their improvement regarding each side of the face and expressed their satisfaction as highly satisfied, satisfied, neutral, and dissatisfied (15).
**Statistical analysis**

Data were analyzed using the statistical package SPSS version 17.

**Results**

This study included 30 patients suffering from post-acne scars. Their age range was 18–32 years with a mean of (24.733 ± 3.676), 18 patients were males (60%) and 12 patients were females (40%). The duration of their post-acne scars ranged between 2 and 10 years with a mean of (4.733 ± 1.837). According to the Fitzpatrick classification of skin photo types, 21 patients (70%) were type III, five patients (16.6%) were type IV, and four patients (13.3%) were of skin type V. The clinical types of acne scars were determined prior to treatment and classified according to the predominant type into Boxcar scars in nine patients (30%), ice pick scars in 10 patients (33.33%), and rolling scars in 11 patients (36.67%). The severity of acne scars before treatment was graded according to the Qualitative Global Grading System and it was mild in nine patients (30%), moderate in 18 patients (60%), and severe in three patients (10%) as shown in ([Figure 1](#figure1)).

Regarding clinical improvement, the right side of the face showed excellent improvement among four patients (13.3%) ([Picture 1](#picture1)), 12 patients (40%) showed marked improvement ([Picture 2](#picture2)), eight patients (26.6%) had moderate improvement ([Picture 4](#picture4)), and six patients (20%) had mild improvement. On the other hand, the left side showed marked improvement among nine patients (30%), moderate improvement in nine patients (30%), and mild improvement in 12 patients (40%).

The overall improvement of the right side was better than on the left side, with a statistically significant difference ($p < 0.001$) ([Figure 2](#figure2)).

Facial erythema, as an adverse effect, was evaluated one week after each session through applying CEA. The erythema was cleared from the right side of seven patients (23.3%) ([Picture 5](#picture5), [Picture 6](#picture6)) and almost cleared in nine patients (30%). In comparison, it was cleared from the left side of three patients (10%) and was almost clear in another three patients (10%). Clearance of erythema following laser session was faster on the right side (PRP-treated side) than on the left side, with a statistically significant difference ($p = 0.0052$) ([Figure 3](#figure3)). Post-inflammatory hyperpigmentation did not occur on the right side.

![Figure 1. Grades of acne scars severity.](#figure1)

![Picture 1. Right side of the face (a) before and (b) after treatment, with excellent improvement of acne scars.](#picture1)

![Picture 2. Left side of the same patient (a) before and (b) after treatment, with marked improvement of acne scars.](#picture2)
side of the face of any patients (Picture 8), while it occurred on the left side of five patients (16.6%). (Picture 7).

Patients presenting with post-inflammatory pigmentation were of darker skin phototype (one patient of skin phototype IV and four patients of skin phototype V). The incidence of PIH among the darker skin phototype was statistically significant \((p = 0.000)\), as shown in (Table 1).

Acneiform eruption was observed after treatment in four patients out of 30 (13.3%) on their left sides, while it occurred only in two patients (6.67%) on their right sides of the face with a statistically significant reduction in the occurrence of acneiform eruption on the right side of the face. Other side effects such as petechiae, infections, milia, scaring, and post-inflammatory hypopigmentation did not occur on both sides.

The severity of acne scars on the right side showed a reduction of severity. Before treatment, 18 patients (60%) were graded as moderate and three patients (10%) as severe. After treatment, 15 patients (50%) were graded as macular, 10 (33.33%) as mild, four (13.3%) as moderate, and one patient (3.33%) as severe, which denotes that there was a statistically significant improvement after treatment \((p = 0.000)\) (Table 2).

A similar finding was also noted on the left side. Acne scar severity before treatment was graded as moderate among 18 patients (60%) and severe in three patients (10%), while after treatment it was graded as macular in seven patients (23.3%), mild in 13 patients (43.3%), moderate in eight patients (26.6%), and severe in two patients (6.67%), which denotes
also that the improvement after treatment was statistically significant ($p = 0.000$) (Table 3).

Patients satisfaction survey for the right side of the face revealed that four patients (13.3%) were highly satisfied, 12 patients (40%) were satisfied, and seven (23.3%) were neutral. The satisfaction for the left side was as follows: six patients (20%), 15 patients (50%), and nine patients (30%) were satisfied, neutral, and dissatisfied, respectively. Patients were satisfied with their right-side treatment more than their left sides, with a statistically significant difference ($p < 0.001$) (Table 4).

**Discussion**

Acne scars cause cosmetic and psychological problems and still lack standardized treatment option. Various therapeutic options have been described with variable outcomes as well as complications (8).

Fractional CO$_2$ laser therapy is based on the theory of fractional photothermolysis, which creates microscopic zones of thermal injury and sparing normal healthy zones in between, which helps in rapid re-epithelization, tissue tightening, and new collagen formation, which in turn improves the appearance of wrinkles and atrophic acne scars (16).

Despite the documented efficacy of fractional CO$_2$ laser resurfacing in the treatment of acne scars, its drawbacks such as long periods of erythema and edema may cause discomfort and hinder patients’ daily lives, limiting its use (17). PRP contains multiple autologous growth factors, especially epidermal growth factor, platelet-derived growth factor, transforming growth factor β, vascular endothelial growth factor, and other cytokines and chemokines (10).

The right side of the face (combined PRP- and fractional CO$_2$-treated side) showed significant clinical improvement compared with the left side, with much more favorable outcome.

There was also a statistically significant reduction in the severity of acne scars on both sides of the face after treatment.

**Figure 3.** The degree of facial erythema on both right and left sides of the face one week after session.

**Figure 5.** Patient after one week of the session; the right side of his face (a) shows less erythema and crustation than his left side (b).

**Figure 6.** Patient after one week of the session; the right side of his face (a) shows less erythema than his left side (b).
Such a reduction of severity was more comparable on the right side, with statistically significant difference. These results were in agreement with those of Lee et al. (12), who compared the effect of fractional CO\textsubscript{2} laser plus PRP on one side versus fractional CO\textsubscript{2} laser alone on the other side, and concluded that the overall degree of clinical improvement was significantly better on the PRP-treated side.

Our results also agree with those of Gawdat et al. (8), who randomized the patients into four groups. They compared intradermal PRP plus fractional CO\textsubscript{2} resurfacing versus fractional CO\textsubscript{2} alone. They also compared intradermal PRP with fractional CO\textsubscript{2} versus topical PRP plus fractional CO\textsubscript{2}. The clinical improvement was excellent in 66.7% of the patients who received fractional CO\textsubscript{2} and intradermal PRP, 60% of the patients who received fractional CO\textsubscript{2} and topical PRP, and 26.7% of the patients who were only treated by fractional CO\textsubscript{2} laser, and there was a statistically significant improvement of the PRP-treated sides over the non-PRP-treated side.

There was a higher percentage of patients with excellent improvement in Gawdat et al.’s study (8) than in our study. This may be attributed to the extra session they performed. Moreover, it might be due to the different assessment parameters as they did not evaluate the severity of acne scars after

### Table 1. The relation between skin phototype and the occurrence of post-inflammatory hyperpigmentation on the left side of the face.

<table>
<thead>
<tr>
<th>PIH (left side)</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No N 21 0.00</td>
<td>4  33.33</td>
<td>0  0.00</td>
<td>25 83.33</td>
<td></td>
</tr>
<tr>
<td>% 70.00</td>
<td>13.33</td>
<td>0.00</td>
<td>83.33</td>
<td></td>
</tr>
<tr>
<td>Yes N 0 0.00</td>
<td>1  33.33</td>
<td>4  13.33</td>
<td>5 16.67</td>
<td></td>
</tr>
<tr>
<td>% 0.00</td>
<td>33.33</td>
<td>13.33</td>
<td>16.67</td>
<td></td>
</tr>
<tr>
<td>Total N 21</td>
<td>5  24.00</td>
<td>4  13.33</td>
<td>30 100.00</td>
<td></td>
</tr>
<tr>
<td>% 70.00</td>
<td>16.67</td>
<td>13.33</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td>Chi-square X&lt;sup&gt;2&lt;/sup&gt; 22.030</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value 0.000*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant

### Table 2. Comparison of acne scars severity degrees before and after treatment of the right side of the face.

<table>
<thead>
<tr>
<th>Degree of severity of acne scars</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>N%</td>
<td>N%</td>
<td></td>
</tr>
<tr>
<td>Macular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilcoxon Signed Ranks z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Comparison of the degree of severity of acne scars before and after treatment on the left side.

<table>
<thead>
<tr>
<th>Degree of severity of acne scars</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>N%</td>
<td>N%</td>
<td></td>
</tr>
<tr>
<td>Macular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td></td>
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<tr>
<td>Moderate</td>
<td></td>
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</tr>
<tr>
<td>Severe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilcoxon Signed Ranks z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. Comparison of the degree of patient satisfaction on both right and left sides of the face.

<table>
<thead>
<tr>
<th>Degree of patient satisfaction</th>
<th>Right side</th>
<th>Left side</th>
</tr>
</thead>
<tbody>
<tr>
<td>N%</td>
<td>N%</td>
<td></td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>7 23.33</td>
<td>9 30.00</td>
</tr>
<tr>
<td>Neutral</td>
<td>7 23.33</td>
<td>15 50.00</td>
</tr>
<tr>
<td>Satisfied</td>
<td>12 40.00</td>
<td>6 20.00</td>
</tr>
<tr>
<td>Highly Satisfied</td>
<td>4 13.33</td>
<td>0 0</td>
</tr>
<tr>
<td>Total</td>
<td>30 100</td>
<td>30 100</td>
</tr>
<tr>
<td>Wilcoxon Signed Ranks z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

*Significant

\[
\text{Wilcoxon Signed Ranks z} = -4.231, p\text{-value} = 0.000^* \]

\[
\text{Chi-square X}^2 = 25.655, p\text{-value} < 0.001^* \]
treatment regarding the left side, which received CO$_2$ laser alone.

On the other hand, our results did not agree with those of Hwang et al. (17), who treated 10 acne scars and 14 facial wrinkle Asian patients by only one session of fractional CO$_2$ laser resurfacing. They stated that near-total improvement (excellent) was reported in 40% of the acne scars patients.

This may be explained by the small sample size in Hwang et al.’s study, the short follow-up period (3 months), and the usage of different scales to evaluate the severity before and after treatment. Mehryar et al. (18) argue for the effectiveness of intradermal injection of PRP as monotherapy and concluded that it didn’t significantly improve crow’s feet wrinkles. The small number of participants may justify such a conclusion. In addition, they did not have a control group, in addition to the relatively short follow-up period.

In the present study, the pronounced clinical improvement of the right side compared with the left side of the face may be attributed to the synergistic effect of both PRP and fractional CO$_2$ laser resurfacing through several mechanisms. These include the release of growth factors from platelets α granules (PDGF, TGF β, VEGF, FGF, epithelial growth factor, and keratinocytes growth factor) as well as many cytokines, chemokines, and resulting metabolites (10). Such factors could serve in rebuilding the lost collagen and elastic fibers, thereby improving the atrophic acne scars and wrinkles (12).

PRP enhances the proliferation of human adipose-derived stem cells. Human-derived fibroblasts and type 1 collagen may be another factor. PDGF is a powerful mitogen for fibroblasts and smooth muscle cells play a role in all the three phases of wound healing (angiogenesis, the formation of fibrous tissue, and re-epithelization) (19). PRP treatment combined with ablative fractional laser increased the epidermal thickness. The stratum corneum became better organized and the collagen density became higher, with better organization of the thicker collagen bundles (20).

PRP-derived TGF β enhances the secretion of basement membrane proteins, such as laminin, collagen IV, and tenascin. This serves the purpose of basement membrane reconstruction and rebuilding the lost matrix needed for the correction of atrophic scars (19).

Moreover, PRP enhances the generation of hyaluronic acid in tissues that draw water into the hyaluronic acid matrix, causing it to swell, increasing the skin turgor, and lubricating the tissue (8).

PRP significantly decreased posttreatment erythema regarding severity reduction as well as shortening its duration. These findings were in agreement with those of Lee et al. (12), who found that the erythema was less on the PRP-treated side, with the total duration of erythema lasting for an average of 10.4 ± 2.7 days on the control side and 8.6 ± 2.0 days on the PRP-treated side. The same finding was also observed by Gawdat et al. (8), who found that the erythema was significantly of shorter duration within PRP- and fractional CO$_2$-laser-treated areas than the other areas treated by CO$_2$ laser alone.

On the other hand, Na et al. (20) explained the minimal erythema on the PRP-treated sides as the platelet contains various materials related to angiogenesis and vascular remodeling. PRP seems to induce the appropriate level of angiogenesis without causing excessive vessel formation. They concluded that combining PRP with fractional CO$_2$ laser resurfacing would be a good strategy in decreasing the post-laser erythema.

Regarding the development of post-inflammatory hyperpigmentation, the present study showed 16.6% of the patients developed PIH on their left sides, no one developed PIH on their right sides, and 13.3% of those who developed PIH were of the dark skin phototype V. These results coincide with those of Gawdat et al. (8), who did not report PIH on the PRP-treated side, whereas it was reported in 13.3% among the patients who received fractional CO$_2$ laser alone. On the other hand, the left sides’ results did not agree with those Chan et al.’s (21) results, who used ablative fractional laser for the treatment of acne scars and skin rejuvenation in Asian patients. They observed the development of PIH in 55.5% of the patients and owed to that the most probably aggressive treatment parameters used, especially the density laser parameter.

It is well known that pigmentary incontinence is the main characteristic feature of PIH, which occurs after the destruction of the basal cell layer. Melanophages residing in the upper dermis phagocytose the degenerating basal keratinocytes and melanocytes, which contain a large amount of melanin. PRP stimulates the secretion of the basement membrane proteins, with resultant faster repair of the basement membrane. This might reduce pigmentary incontinence (8).

Another explanation might be that TGF β, which PRP releases, is also known to decrease melanogenesis (22).

In addition, Chan et al. (21) concluded that PIH correlates with the degree of inflammation and the extent of dermo-epidermal junction disruption. Using PRP, which contains anti-inflammatory substances, may help in rapid tissue regeneration (23). The combined protocol applied in our study may facilitate achieving optimum results and avoiding or minimizing possible complications among patients undergoing fractional CO$_2$ laser resurfacing. Most of the Egyptian population range between type 3 and type 4 phototypes, and some of them are vulnerable to post-laser complications. The incidence of acneiform eruption showed statistically significant reduction after laser session on the right sides of the face, a result that is agreement with that of Gawdat et al. (8), who reported that no acneiform eruption was developed on the PRP-treated sides after the laser session. Disruption of follicular units during treatment with aberrant follicular epithelization during healing may contribute to acneiform eruption. In addition, downtime reduction on the PRP-treated side may decrease the need for moisturizers, which might have contributed to the development of such eruption (24).

Concerning patient’s satisfaction, they were highly satisfied as regard their right side, with a statistically significant higher degree of satisfaction as regard the right side than the left side of the face, a result that is agreement with the study of Gawdat et al. (8).

**Conclusion**

Our results showed that the combination of fractional CO$_2$ laser resurfacing and intradermal PRP injection in the
treatment of acne scars gave better results than fractional CO2 laser alone regarding the overall improvement in both challenging cosmetic problems. This combination therapy may have a positive impact on the quality of life of patients. It could help them achieve the maximum benefit of fractional CO2 laser resurfacing during their way of treating acne scars without the annoying side effects that may interfere with their daily activities.

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References
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