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Skin microneedling alone versus skin microneedling plus Platelet rich plasma PRP in the treatment of atrophic post acne scars (A split face comparative study)

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Abstract: Objective: The aim of this study is to compare the efficacy of microneedling(MN) followed by platelet rich plasma(PRP) with microneedling alone in the treatment of atrophic acne scars.

Patients and Methods: Experimental study without controlled study conducted for the period one year (May 2020- May 2021) at Tishreen University Hospital in Lattakia- Syria. The study included 35 patients with atrophic acne scars who received MN with PRP on the left side of the face (group I), and MN alone on the right side (group II).

Results: Mean age was 29.7±7.8 years, the most frequent age group was 20- 30 year (62.9%), and female represented 62.9% of the patients. Acne scars ranged in severity from moderate (38.6%) to severe (55.7%), and boxcar was the most frequent type (41.4%). A statistically significantly reduction was occurred at the end of treatment in group I (6.37±3.5 vs 12.80±3.9) and group II (8.57±4.2 vs 11.88±4.5) according to Goodman and Barron, but the reduction was higher in groupI. The best therapeutic results (excellent and good) were obtained in groupI especially in boxcar type. Regarding of side effects, pain, edema, and erythema were occurred in all cases in the two group, and the mean duration of edema and erythema was significantly shorter in group I.

Conclusion: Combination of MN and PRP was found to be safe and efficacious in the treatment of atrophic acne scars.

Keywords: acne scars, microneedling, platelet rich plasma.

علاج الندب العدية الضمورية بطريقة الوخز بالإبر الدقيقة وحده مقابل الوخز بالإبر الدقيقة مع البلازما الغنية بالصفيحات (دراسة مقارنة بين نصفي الوجه)

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المستخلص: هدفت الدراسة إلى مقارنة فعالية الوخز بالإبر الدقيقة بالاقتران مع البلازما الغنية بالصفيحات في علاج الندب العدية الضمورية مقابل الوخز بالإبر الدقيقة لوحده.

طريقة البحث: كانت هذه دراسة تجريبية من دون مجموعة سيطرة أجريت في مشفى تشرين الجامعي في اللاذقية- سوريا خلال الفترة الممتدة ما بين أيار 2020- أيار 2021. شملت الدراسة 35 مريضاً مصاباً بالندب العدية تلقوا العلاج بالوخز بالإبر الدقيقة مع مشاركة البلازما الغنية بالصفيحات في الجهة اليسرى من الوجه (المجموعة الأولى)، والعلاج بالوخز بالإبر الدقيقة فقط في الجهة اليمنى من الوجه (المجموعة الثانية).

النتائج: بلغ متوسط العمر 29.7 ± 7.8، الفئة العمرية الأكثر تواتراً هي 20- 30 سنة (62.9%)، 62.9% من المرضى هم من الاناث. تراوحت غالبية الندب العدية في شدتها من المتوسطة (38.6%) إلى الشديدة (55.7%)، وإن عربة النقل هو النمط الأكثر تواتراً (41.4%). حدث تناقص ذات أهمية معنوية في نهاية العلاج في شدب الندب العدية في المجموعة الأولى تبعاً لمقياس Goodmand&Barron (6.37 ± 3.5 مقابل 12.80 ± 3.9) والمجموعة الثانية (8.57 ± 4.2 مقابل 11.88 ± 4.5)، ولكن درجة الانخفاض كانت أكبر في المجموعة الأولى. تم الحصول على النتائج العلاجية الأفضل (التحسن الجيد والممتاز) في المجموعة الأولى خاصة في نمط عربة النقل. بدراسة الآثار الجانبية فإن الألم، الحمامى، الوذمة حدثت في جميع الحالات وبكلا العلاجين، مع متوسط عدد أيام الإصابة بالوذمة والحمامى أقل في المجموعة الأولى وذات دلالة معنوية.

الاستنتاج: إن ترافق البلازما الغنية بالصفيحات مع الوخز بالإبر الدقيقة هو طريقة آمنة وفعالة في علاج الندب العدية الضمورية.

الكلمات المفتاحية: الندب العدية، الوخز بالإبر الدقيقة، البلازما الغنية بالصفيحات.

Introduction.

Acne vulgaris is the most common skin disease among adolescents and young adults. It affects approximately 85% of young adults aged 12- 24 years [1]. Acne is more common in males than in females during adolescence, after that it is more common in women [2].

The pilosebaceous unit is well known as the site of acne development, and pathogenesis of acne involves interplay of several factors including: host factors such as stimulation of sebaceous glands mediated with androgen, dysbiosis within of microbiome, innate and cellular immune response, genetic, and possibly the diet [3, 4].

Typical lesions of acne include comedones, inflammatory papules, and pustules. Nodules and cysts occur in more severe acne, and can cause scarring [5]. There are numerous treatments for acne vulgaris including topical, oral, and procedural therapies, which aimed at combatting key aspects of the pathogenic mechanisms of lesions formation [6, 7]. Early intervention is essential to decrease the physical and esthetic burden of disease with improvement quality of life [7].

Scars appear as a result of skin damage during the process of the skin healing. The mechanism of scarring in acne is complex, and inflammatory process of acne becomes more pronounced in patients with scarring [8]. There are two types of scars: hypertrophic and atrophic which is the most frequent type [9].

Although a variety of therapies may reduce the prominence of acne scars, no therapy removes scars completely, and treatment of acne scarring remains a therapeutic challenge, due to it represents a high economical and psychological burden for the society [10].

Micro needling (MN) is considered noninvasive esthetic procedure with a low rate of associated effects. MN is thought to induce more collagen in the upper part of the dermis after breaking collagen bundles in the superficial layer of dermis that are responsible for scars. In addition to that, MN deliver sufficient amount of drug to give a required therapeutic response [11].

Platelet rich plasma(PRP) is an increased concentration of autologous platelets suspended in a small amount of plasma after centrifugation. It may be beneficial in acne scars by promoting collagen deposition [12]. There is limited comparison of the effects of MN with PRP in treatment atrophic acne

scars. Thus, this study was conducted to: 1- compare the effectiveness of combined MN with PRP versus MN alone for the treatment of atrophic acne scars. 2- assessment the side effects of the treatment by MN alone compared to MN with PRP. 3- to determine if there is any correlation between the improvement and the type of scars.

Patients and Methods.

This is an experimental study of a group of patients (35 patients) older than 18 years with atrophic acne scars was held in dermatology department at Tishreen University Hospital in Lattakia- Syria during the period from May 2020 to May 2021. Exclusion criteria were patients with one of the following: pregnancy or lactation, active infection, bleeding or coagulation disorders, patients receiving treatment with oral isotretinoin, and patients with positive hepatitis B surface antigen (HBs Ag) or hepatitis C antibody (HCV Abs).

Patients were classified according to Fitzpatrick skin photo type. Scars were graded according to The Goodman quantitative post acne scarring grading system. PRP production starts with collection of 10 ml of venous blood, centrifuging the sample at intensely high speed 2500 RPM to separate the blood cells from the plasma and platelets (PRP), then PRP centrifuge at speed 3500 RPM for 10 minute with adding calcium gluconate.

All patients were received treatment with MN with PRP on the left side of face (group I), and MN alone on the right side of the face (group II).

After sterilizing the lesions site, patients were given local anesthesia (lidocaine gel) before one half of initiation the treatment, and repeated every 10 minutes. MN was conducted with the Dermapen micro needling pen. The MN procedure involves a combination of horizontal, vertical, and oblique device passes on the selected lesions, repeating approximately 4 to 10 times. PRP was applied on the left side of face after MN procedure and left for five minutes. Every patient has received a session every three weeks for a maximum 4 sessions. Goodman acne scar grading system was used for assessment by a side by side comparison of preoperative and postoperative photographs taken at their first visit and at the end of 3 months after the last session. The clinical improvement and changes were evaluated by the dermatologist before treatment and at three months after the start of the treatment based on the scale: mild= 0- 24%, moderate= 25- 49%, good= 50- 74%, excellent= 75- 100%.

Definition:

The Fitzpatrick skin phototype system is used to categorize skin types in people of all skin color. The classification depends on the amount of melanin pigment in the skin. Patients are categorized from fair skin types (type I) to very dark skin types(VI) based on constitutive skin color and response to sunlight and UV radiation [13].

The Goodman quantitative post acne scarring grading system is a photographic assessment that results in a more detailed global severity score ranging from 0 to 84 points. The grading scale is based on scar counts of 5 different morphologies and encompasses the severity of each scar subtype [14].

Ethical consideration: After discussing the study with the patients, all of them gave a complete and clear informed consent to participate in the study. This study was performed in accordance with the Declaration of Helsinki and approval for the study was obtained from the institutional ethics committee.

Statistical Analysis:

Statistical analysis was performed by using IBM SPSS version20. Basic Descriptive statistics included means, standard deviations(SD), median, Frequency and percentages. To examine the relationships and comparisons between the two groups, chi- square test was used or Fisher exact test if it need. Independent t student test was used to compare two independent groups. Wilcoxon test to compare two paired groups. All the tests were considered significant at a 5% type I error rate($p<0.05$), β:20%, and power of the study: 80%.

Results.

The study included 35 patients with atrophic acne scars. As table one shows, ages range from 22 to 45 years, patients were divided into three groups: 20- 30(62.9%), 30- 40(22.9%), and >40(14.3%). 13 patients were males and 22 were females with sex ratio of F:M (1.7:1). According to Fitzpatrick skin type scale, patients were classified to: II:11.4%, III:62.9%, IV:25.7%. Severe form of scars represented 55.7% of the patients, followed by moderate 38.6%, and mild 5.7%. Box car represented the most frequent type of scars (41.4%), followed by rolling type (31.4%), and icepick (27.1%).

Table (1) Demographic characteristics of the study population

Variables	
Age(years)	22- 45(29.7±7.8)
Age group	
20- 30	22(62.9%)
30- 40	8(22.9%)
>40	5(14.3%)
Gender	
Male	13(37.10 %)
Female	22(62.9 %)
Fitzpatrick skin phototype	
II	4(11.4%)
III	22(62.9%)
IV	9(25.7%)

Variables	
Goodman and Baron classification	
Mild	4(5.7%)
Moderate	27(38.6%)
Severe	39(55.7%)
Scars type	
Box car	29(41.4%)
Rolling	22(31.4%)
Icepick	19(27.1%)

Compared to baseline, after three months of treatment, the severity of scars decreased in the group I (6.37±3.5 vs12.80±3.9, p<0.001), and group II (8.57±4.2 vs 11.88±4.5, p: <0.001). The percentage of reduction was better in group I than in group II (50.2% vs 27.7%).

In group I, the number of the patients that presented with mild, moderate, good, and excellent improvement were 3, 21, 8, and 3 respectively. In group 2, the numbers were 9, 22, 3, 1, respectively, with significant difference p<0.05.

All patients reported slight pain, facial edema, and erythema after the procedure. Mean duration of the edema and erythema was shorter in the group I compared to group II; (2.3±1.1 vs3.9±1.2, p<0.05) and (4.1±0.9 vs 6.5±1.3, p<0.01) respectively.

Table (2) Changes in acne scars after treatment in the two groups

Variable	Needling & PRP Group I (left side)	Needling Group II (right side)	P value
Goodman &Baron scale			
Before treatment	12.80±3.9	11.88±4.5	>0.05
After treatment	6.37±3.5	8.57±4.2	>0.05
P value	0.0001	0.003	
Improvement grade			
Mild	3(8.6%)	9(25.7%)	
Moderate	21(60%)	22(62.9%)	<0.05*
Good	8(22.9%)	3(8.6%)	
Excellent	3(8.6%)	1(2.9%)	
Duration of side effects (day)			
Edema	2.3±1.1	3.9±1.2	<0.05*
Erythema	4.1±0.9	6.5±1.3	<0.01*

* Significance

Changes in Goodman &Baron scale and improvement in scars severity were represented in the figure (1) and (2).

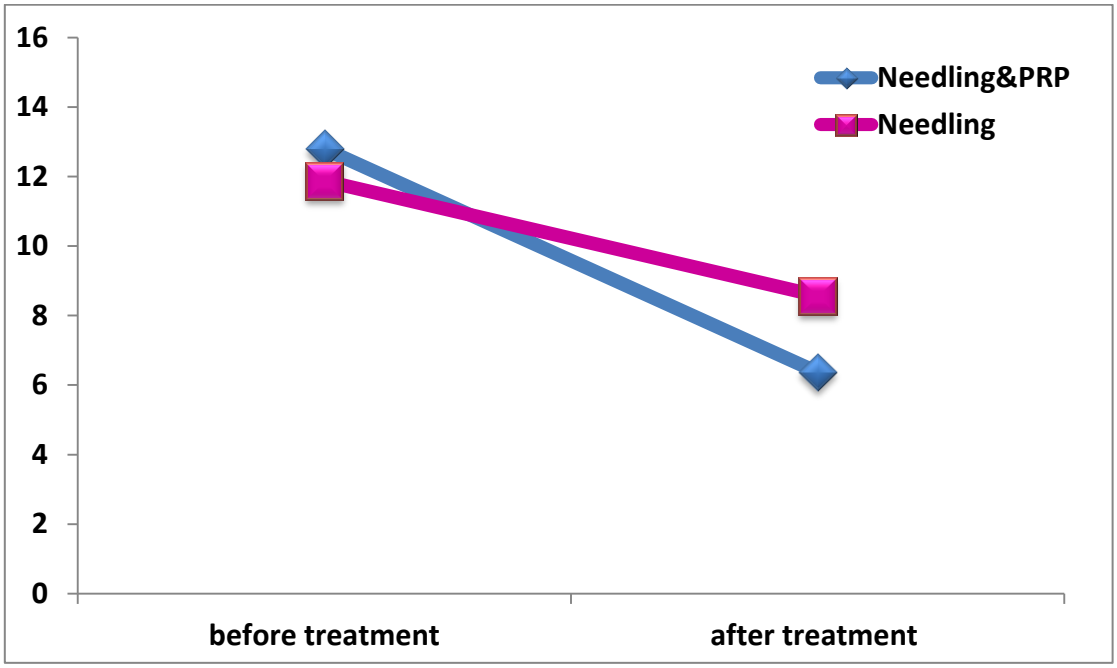

Figure (1) Alteration in Goodman &Baron scale after treatment

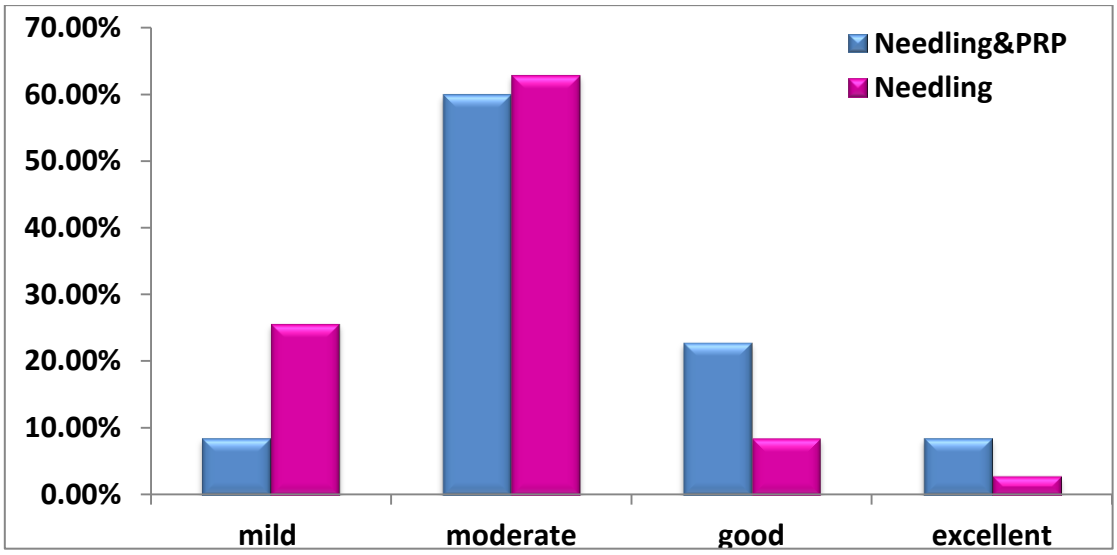

Figure (2) Improvement in scars severity after treatment in the two groups

On correlating the response to treatment with the type of acne scars, the current study showed that good (14.3%) to excellent (8.6%) results were in boxcar scars in group I, but without a significant difference.

Table (3) Distribution of response to the treatment according to the type of scars

	Needling & PRP				Needling			
	Mild	Moderate	Good	Excellent	Mild	Moderate	Good	Excellent
Icepick	1(2.9)	9(25.7)	0(0)	0(0)	4(11.4)	8(22.9)	0(0)	0(0)

	Needling & PRP				Needling			
	Mild	Moderate	Good	Excellent	Mild	Moderate	Good	Excellent
Box car	1(2.9)	7(20)	5(14.3)	3(8.6)	3(8.6)	7(20)	2(5.7)	1(2.9)
Rolling	1(2.9)	5(14.3)	3(8.6)	0(0)	2(5.7)	7(20)	1(2.9)	0(0)
P- value	>0.05				>0.05			

Discussion.

To date, a variety of treatment methods for acne scars have been proposed. However, most of them cannot achieve satisfactory treatment effect.

The current study of 35 patients affected with atrophic acne scars showed that nearly two third of the patients were in the age group 20- 30 years, with a significant predominance of female. This is may be explained by decreasing the prevalence of acne with increasing age. In addition to that, seeking medical attention early enough in females compared to males.

The predominant type was boxcar, and majority of patients had moderate to severe acne scars. This is may be due to genetic factors, severity of disease, and delay in the initiation of treatment. There was a significant improvement in the severity of scars in two groups, especially in the group I who received MN with PRP. Good to excellent results of improvement were more frequent in MN with PRP group especially in boxcar type. These findings might be explained by the following: MN creates perforations in the papillary dermis, and this trauma results in platelet and fibroblast activation and collagen induction. In addition to that, MN ruptures fine blood vessels and breaks collagen strands in superficial dermal layer resulting in removal of damaged collagen [15]. Through the secretion of platelet's alpha granules, PRP increases release of growth factors including: platelet growth factor, vascular endothelial growth factor, and insulin like growth factor. Additionally, platelets may release numerous anti- inflammatory cytokines [16].

There are limited studies that compared the effects of combination of MN with PRP in treatment atrophic acne scars versus MN alone, and absence of local studies prompt us to do this study.

Ibrahim *et al.*, (2017) found in a study conducted in 36 patients with atrophic acne scars; 18 patients received MN alone (group I) and 18 patients received MN combined with PRP(groupII) the following: the rate of reduction in scars severity was 28.57% in group I versus 48.13% in group II. Improvement was moderate in most cases of the group I, and good in groupII [17].

Ibrahim *et al.*, (2018) demonstrated in a study conducted in 35 patients with atrophic acne scars who received MN alone on the right side of face (group I) and MN with PRP on the left side of face(groupII) the following: the rate of reduction in scars severity was 34.4% in group I versus 43.75% in group II. Excellent Improvement was more frequently in the group II, and most observed side effects were edema and erythema [18].

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