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The contribution of PRP injection in the after-effects of skin scars on the face

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ABSTRACT

PRP corresponds to a plasma preparation in which the platelets have been concentrated, it is used as a source of bioactive proteins, mainly growth factors, known to play a role of primary importance in the process of tissue regeneration.Our work consists of a prospective study of a series of 23 patients with skin scars on the face within the Department of Maxillofacial and Plastic Surgery at the Avicenna Military Hospital. This study was conducted over a period of 18 months, from January 2015 to July 2016.The objective of this work is to highlight the contribution of the injection of PRP in the after-effects of skin scars from the face to through an epidemiological and clinical study in order to retain indications in this field. Our study opts for a non-surgical and minimally invasive technique by injecting PRP by taking advantage of the biological and physiological virtues which are attributed to it and already verified in other disciplines. especially in orthodontics and sports medicine. PRP injection is a safe and effective therapy with no significant side effects. It is a promising product due to its autologous origin, its simplicity of obtaining and its mechanism of action.

Keywords : Plasma, platelets, scarring, growth factor, tissue regeneration

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INTRODUCTION

PRP corresponds to a plasma preparation in which the platelets have been concentrated, it is used as a source of bioactive proteins, mainly growth factors, known to play a role of first importance in the process of tissue regeneration.

The scar on the face poses a real problem, both aesthetic and social. By definition, a scar is indelible, so it is impossible, whatever the means, to make it disappear completely.Moreover, There are multiple surgical and non-surgical techniques to reduce it (such as corticosteroids, peeling and the laser).

Our study opts for a non-surgical and minimally invasive technique by injecting PRP by taking advantage of the biological and physiological virtues which are attributed to it and already verified in other disciplines, notably in orthodontics and sports medicine. [1], [2], [3]

MATERIALS AND METHOD

In this sense, we conducted a prospective study of a series of 23 patients with skin scars of the face within the Maxillofacial and Plastic Surgery Service at the Avicenne Military Hospital. This study covered a period of 18 months, ranging from January 2015 to July 2016.

The objective of this work is to highlight the contribution of PRP injection in the after-effects of skin scars of the face through an epidemiological and clinical study in order to retain indications in this area.

We included in our study all consenting patients with scars on the painful, reddish, inflammatory, hard, hyperchromic, depressed or scarred bridle scars. been included.

We have excluded all unstable, keloid, or tumor scars.

Data collection was carried out using an operating sheet and scar balance previously established and completed as patients are taken care of.

During our study, a pre-therapeutic consultation is the rule. An informed consent is delivered a week later to consenting patients. Treatment is carried out on an outpatient basis, in 3 to 5 sessions depending on the scar, spaced about a month using the REGENLAB®. Each patient in the study benefited from regular and appropriate monitoring.

The sessions took place according to the following scheme:

In the external care room, an 8ml sample of whole blood is taken in the Regentube followed by an initial assessment. Thereafter, the tube is placed in the Regenlab centrifuge preprogrammed on a rotation number of 3200 revolutions per minute for 5 minutes. Immediately after centrifugation, take 3 to 5 ml of the fraction above the separating gel which represents the plasma rich in platelets. This PRP is injected intradermally over the extent of the scar after disinfection and application of a cream. for local anesthesia.

RESULTS AND DISCUSSION

Our results were as following

Regarding the epidemiological data from our series: the average age was 21.4 years, for the distribution of our patients by sex: We noted a clear male predominance of 15 Men and 8 Women.

With regard to the etiologies of scars: AVP was by far the most frequent etiology with a percentage of 80%, followed by aggression and domestic accidents at percentages equal to 10%.

The clinical examination of the scars allowed us to identify the following elements: the area most affected by facial trauma in our patients was the forehead with a rate of 39%, followed by the right cheek with a rate of 30%. the shape of the scars, 16 were linear, ie 70%, 02 in V or 9% of cases, 02 in scale, 01 round following an animal bite, and 02 scar bridles on burns.

The Vancouver score was initially 8.33 with 87% inflammatory scars, 52% red and 34% purple.

39% of the scars were hard, 43% solid and not very stretchy.

For dimensions, average length, width and thickness were 51.13mm, 6.09mm and 3mm respectively.

At the last PRP session, the Vancouver score became 2.59 with 91% non-inflammatory scars and 65% flexible.

The average length and width remained almost unchanged while the average thickness increased from 3 to 1mm.

Table I: Average dimensions of scars before and after PRP

Dimensions	Avant PRP	Après PRP
Epaisseur en mm	3	1
Longueur en mm	51,13	50,2
Largeur en mm	6,09	5,8

Table II: Monthly assessment of scars treated by the Vancouver test

Paramètres	Immédiat	A 1 mois	A 2 mois	A 3 mois	A 4 mois*	A 5 mois*
Inflammation	1.73	1.38	1.06	0.4	0.15	0.09
Couleur	2.08	1.94	1.12	0.3	0.3	0.3
Epaisseur	2	2	1.65	1.23	1	1
Extensibilité	2.52	2.31	2	1.9	1.5	1.2
Score moyen	8.33	7.63	5.83	3.83	2.95	2.59

Regarding the sensitivity of scars, the VAS of 15 patients was between 3 and 6, i.e. 65.2% of the cases. 07 were between 0 and 3 or 30.4% of cases and only one patient at 8 or 4.4% of cases.

The VAS progressively decreased from the first to the third month with 18 patients between 0 and 3, ie 78.3% and 5 patients with 5, ie 21.7% of the cases.

Table III: The sensitivity of scars before and after PRP

Sensibilité selon EVA	Avant PRP	Après PRP
Pas ou peu gênante (0-3)	30.4%	78.3%
Gênante (3-6)	65.2%	21.7%
Hyperalgique (7-10)	4.4%	0%

Regarding the paraclinical data of our study:

The average platelet value was 237x103 PLQ / L in whole blood and 445x103 PLQ / L, or 1.88 times the initial value in PRP.

CLINICAL CASES

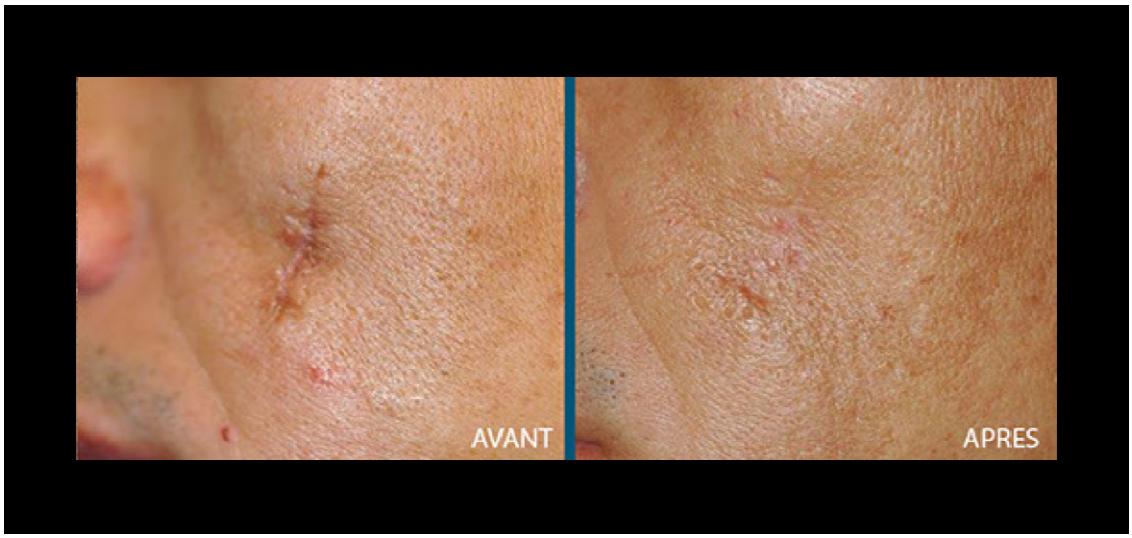

Figure 1: clinical case 1 before and after PRP injection

Mr. M, 27 years old, victim of an AVP at the age of 12 years old. He presented himself for a scar on the left cheek initially treated with adhesive tapes. The clinical examination had objectified a linear scar hyper pigmented brownish with a length of 15mm, a width of 2mm and a thickness of 1mm. It was firm in consistency and not very stretchy. The Vancouver score was initially 9.

After three PRP sessions, there was a marked improvement in the scar, which became lighter, matching the patient's normal skin color. The dimensions have remained unchanged. Its consistency has become flexible and its extensibility normal. The Vancouver score has become 1.

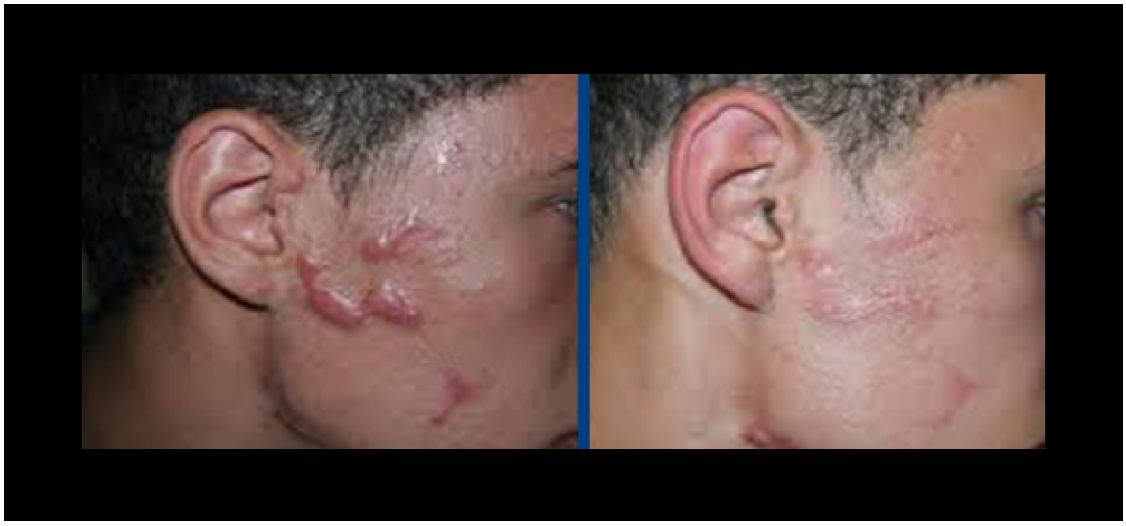

Figure 2: clinical case 2 before and after PRP injection

Mr. N, 15 years old, victim of an AVP for two years. He presented for consultation for a scar on the right cheek. The clinical examination objectified a scar pre-auricular in V, inflammatory of color purple , of hard consistency and not very extensible. It was 35mm in length, 3mm in width and 3mm thick. The initial Vancouver score was 10.

After five PRP sessions, the scar became pink, non-inflammatory, soft in consistency with minimal resistance. We also noted a reduction in dimensions with a length of 30mm, a width of 2mm and a thickness of 1mm. The Vancouver score became 3.

DISCUSSION

We will discuss our results in light of data from the literature.

Starting with the characteristics of PRP, a big question hampers the development of the use of PRP: What should be the ideal concentration of platelets in order to obtain an optimal clinical result? Even today, this problem is not resolved. In 2004, Marx announced that a PRP should have a platelet concentration of 3 to 4 x normal [04], [05], [06]. However, Sanchez in 2012, said that a PRP must have a platelet concentration at 2 x normal in order to be considered a therapeutic PRP. Lower concentrations would not be effective, while higher concentrations would not bring more effectiveness. The data of our study therefore join those of the literature with a value of 1.88x normal.

According to Scott and Khan, the presence of red blood cells in PRP would have a deleterious effect on tissue repair. One of the reasons for choosing Regenlab tubes in our protocol is that they contain thixotropic gel. Thus, our PRP does not contain red blood cells. [07]. Regarding leukocytes, this remains an important point of discussion, indeed, Sanchez and Letartre would be in favor of a PRP stripped of leukocytes. Braun recommends their presence [08], [09]. Some groups have therefore recommended that the presence of leukocytes may be negative for the therapeutic result. Others have found no valid reason to cancel them.

In China, a study looked at the effect of blood thinners on PRP. Citrate-Dextrose Adenosine Acid and Citrate-Theophylline-Adenosine-Dipyramidole performed better than the heparin and sodium

citrate used in our study. [06], [10]

Concerning the activators, the gelation is only valid for the preparation of PRP in gel form. In our protocol, no activator was used.

The injection of PRP into scars has several advantages, among which we find: Immediate bioavailability, Localized action and concentrated supply creating a local environment favorable to scarring, Also control of inflammation and pain, confirmed in the study by Zhang, Wang and Middleton explaining the anti-inflammatory effect found on our results [11]. Knowing the influence of growth factors on cell migration and proliferation, it is legitimate to think that PRP optimizes regeneration. Sanchez testified in 2015, at his disposal, two cell cultures as you see in Figures 3 and 4, one in the presence of PRP and the other witness. He counted on the PRP culture more than twice as many cells in 24 hours compared to the control, therefore he concluded that PRP stimulates cell proliferation [09], [12]. Likewise, he found that cells migrated much more and much faster in the presence of PRP.

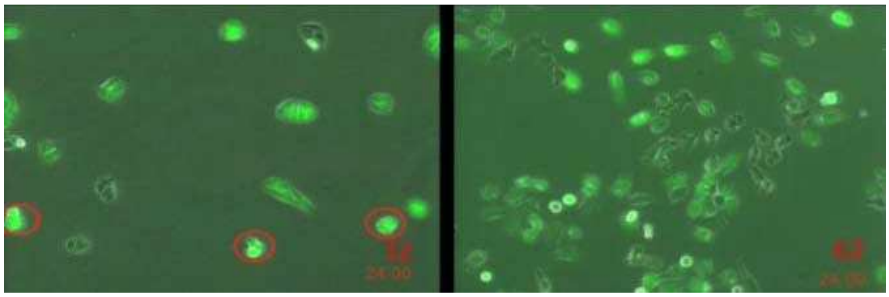

Figure 3: Evaluation of cell proliferation for 24 hours on a control culture (left) and a culture in the presence of PRP (right)

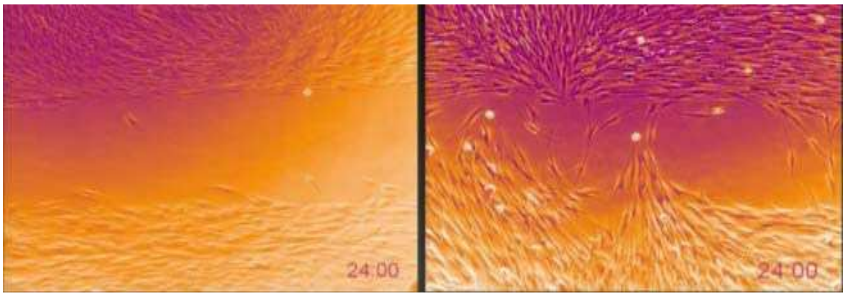

Figure 4: Evaluation of cell migration for 24 hours on a control culture (left) and a culture in the presence of PRP (right)

For the angiogenic nature of PRP, Lyras conducted a study in 2016 concluding that PRP stimulates neovascularization, accelerates and improves the healing process [13]. On the other hand, PRP has a strong anabolic power: Kajikawa and Mishra in 2008 observe a stimulation of collagen synthesis by PRP [14]. De Mos in 2008 affirms that PRP increases the expression of metalloproteinases and finally, Bosch in 2010 found that the quantities of DNA, glycosaminoglycans and especially collagen are greater in the presence of PRP. They conclude with a higher metabolic activity, The reason why we excluded any suspicious lesion or scar of tumor origin from our study. Finally, the PRP exerts a brief action explained by the speed of degradation of the growth factors that is why It is essential to repeat the injections. To achieve our results, we used at least three sessions at one month intervals.

Now let's go to the different experiences of PRP in skin scars:

In 2013, Cheng conducted a study on the contribution of PRP in severe facial acne scars. For this he took a 40ml sample of blood in a citrated tube, he followed a double centrifugation protocol: soft spin at 1500 rpm / 10min then hard spin at 3000rpm / 20min to obtain a PRP whose platelet concentration is 10 times the initial value and the success rate was 90.9%. Other studies have been carried out to demonstrate the contribution of PRP in the management of several types of wounds and skin scars, particularly in Italy and Japan , in Egypt, in India, and in the United States.

The results obtained in most of these studies, including our own, are consistent and very satisfactory despite the diversity of protocols.

Auteur	Pays	Indications	Prélèvement	Centrifugation	Activateur	[PLQ] dans le PRP	Succès
Cheng B 2013	Chine	Cicatrices d'acné sévère de la face	40ml + CDA	2x :1500rpm/10min puis 3000rpm/20min	Ca^{2+}	10 x la valeur initiale	**90.9%**
Motolese 2015	Italie	Ulcère cutanée chronique	NR	1x : 145g /17min	Ca^{2+} +Thr	NR	**100%**
Yotsu 2015	Japon	Ulcères chroniques des pieds	60ml + CDA	2x :200g/10min puis 1500g/20min	NR	NR	**100%**
Nofal 2014	Egypte	Cicatrices atrophiques d'acné	10ml + CDA	2x : 150 à 200g/10min puis 1500 à 2000g/15min	Ca^{2+}	4,5 à 5x la valeur initiale	**100%**
Chawla 2014	Inde	Cicatrices atrophiques d'acné	10ml + CDA	2x : 1500rpm/10min puis 3700rpm/10min	Ca^{2+}	4 à 5 x la valeur initiale	**80.1%**
Kontopodis 2015	NewYork	Plaies diabétiques	8ml	1x : 3000rpm/8min	NR	NR	**72.2%**
Asif 2016	Inde	Cicatrices atrophiques d'acné	17ml + CDA	2x : 293,88g/5min puis 690,96/17min	Ca^{2+}	NR	**94%**
Notre série 2017	Maroc	Séquelles de cicatrices de la face	8ml + CDA + Thixotropic gel	1x : 1200rpm/10min	Aucun	1.88 x la valeur initiale	**74.3%**

Our recommendations are as follows:

For a dyschromic and hard inflammatory scar, the patient must be convinced and consenting to a good adherence to therapy. Regarding the protocol, we recommend: the use of a sterile closed-circuit kit to minimize the risk of infection, the addition of a citrate buffer to regulate the PH, the injection of PRP immediately after centrifugation without activator and after local anesthesia for patient comfort, and ideally we recommend five sessions one month apart for best results.

CONCLUSION:

At the end of our work, we concluded that the injection of PRP is a safe and effective therapy without significant side effects. It is a promising product due to its autologous origin, its simplicity of obtaining and its mechanism of action. More studies are needed on a larger number of patients to confirm its effectiveness and safety. Also more research is needed to establish the ideal method of preparing PRP, to clarify the optimum dose of PRP per session. , the number of sessions required and the interval between sessions in order to standardize this cell therapy.

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