Platelet rich plasma (PRP) for facial rejuvenation

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Dermal stimulation and augmentation represent the main facial treatments in aesthetic medicine. Their use continues to increase. Treatments primarily use a bioresorbable substance, such as hyaluronic acid. There are also numerous exogenous fillers that may also be used to obtain a fibrotic response, at the dermal level, resulting in volume augmentation.

As biodegradable substances, these exogenous injectables can have distinct disadvantages. They may cause transient effects, such as persistent erythema, swelling and encapsulation, granuloma formation and sometimes, even chronic or delayed infections. Consequently, the physicians and aesthetic dermatologists have sought an autologous source for soft tissue augmentation.

As a result, human growth factors have been widely studied and today there are clinical applications of several individual growth factors. Examples are a keratinocyte growth factor (Kepivance®, Sweden) for oral mucositis and platelet derived growth factor (Regranex, UK) for non-healing diabetic wounds. However, these exogenous growth factors, when applied outside their normal environment, may have unwanted side effects. In 2008, the U.S. FDA identified the use of Becaplermin as a possible cause of increased cancer mortality. Similarly, the safe use of Palifermin has not been established.

In contrast, autologous platelets are an excellent source of growth factors due to their biological properties and their endogenous origin. They are now the main source of growth factors used to facilitate wound healing. It has been shown that the application of a Platelet Rich Plasma (PRP) enhances early wound healing (6, 7, 15), and improves healing in diabetic ulcers (3). Since the 1990s, the application of platelet preparations for wound healing has outpaced that of isolated, exogenous growth factors.

Apart from the wide use of PRP to accelerate wound healing, there is substantial clinical evidence regarding its use in other medical fields. For example, cross-linked PRP forms a gel which is widely used in orthopedics (11, 12), as well as in maxillofacial surgery (9).

Following the successful use of Platelet Rich Plasma in the field of medical pathology, it is now being used in the aesthetics arena.

Several platelet preparation systems and their clinical use have been developed. During each process, the erythrocytes are separated from the leukocytes and the platelets into distinct fractions. The platelet pellets are then re-suspended into a reduced volume of the recovered plasma, resulting in a 6–7 times enhancement of the original concentration of platelets (5). The substantial concentration of platelets, compared to normal blood, represents a unique source of growth factors. After its injection into the targeted tissue, such as the dermis and the subcutaneous layers, the platelets are activated endogenously by the coagulation factors normally present in these tissues.

This activation leads to a significant degradation of the platelets, which promotes the release of a series of growth factors such as: PGDF, ILGF, EGF, and TGFβ. The activated platelets also release numerous proteins, including adhesive glycoproteins such as fibrin, fibronectin and vitronectin. After the subcutaneous injection, these proteins and growth factors interact with the basal cells in the subcutaneous tissue such as: fibroblasts, endothelial cells, subcutaneous stem cells, etc.

After binding to their specific cellular receptors, the glycoproteins and the growth factors activate the intracellular processes that may stimulate: cell proliferation, migration, survival, as well as the production of extra-cellular matrix proteins. All these processes contribute to tissue rejuvenation.

Platelet Rich Plasma (PRP) is also used in the aesthetic field for the stimulation of the superficial dermis as well as for the deep layers of the dermis. For superficial stimulation, the injection must be performed in the superficial dermis. It can be done by using a mesotherapy technique in order to enhance the skin texture, glow and hydration. When used as a filler, the PRP must be injected into the deep dermis or into the sub-dermal tissues in a manner similar to the techniques commonly used for fillers. This is done to volumise and reshape the skin. This type of PRP application augments the skin and increases its volume (4, 8).

Thanks to the autologous characteristics of this product, the side effects are minimal. They usually take the form of mild bruising, occasional swelling and rarely, infections.. The contraindications include: pregnancy, breastfeeding, autoimmune or blood diseases and cancer. There are a number of kits for PRP harvesting available internationally, and include: MyCells®, Selphyl, RegentLab, etc. However, for many of them, there is a lack of detailed information about use, yields and the quality of the PRP they produce.

Since numerous scientific references are available for the MyCells® Autologous Platelet Preparation Kit, it is often preferred for corrective dermatology and facial aesthetic treatments. It was cleared by the FDA in November 2009, and is designed for the harvesting of autologous PRP destined to be re-injected. The MyCells kit is also authorized by the Medical Device Committee of the European Union and by the Israeli Ministry of Health. Its PRP is widely used for facial rejuvenation injections in 3 countries: Japan, the United Kingdom, and Israel.

Studies done with the MyCells® kit show that the PRP obtained has superior characteristics. Some of the platelet properties obtained using the kit have been evaluated *in vitro*. These characteristics include:, recovery, aggregation with respect to the activation of collagen (measurement of the aggregation response), response to hypotonic stress (demonstrating the integrity of the platelet membrane), production of P-selectin (detection on the platelet membrane indicates platelet activation), and increased production of human growth factor secretions (VEGF, EGF, PDGF-BB). Also, the recovery rate of CD34, a marker of the hematopoietic stem cells, has been shown to increase. However, there remains a paucity of publications regarding the safety and efficiency of the PRP injections.

The results of a pilot study of 10 women has demonstrated that the PRP injection for facial rejuvenation or filler was effective and safe. The success was observed in areas of the face regarded as difficult, such as the contour of the eyes and the neck. Another clinical study, conducted using the MyCells kit in Japan, the United Kingdom and Israel, included 400 women. It evaluated the clinical effects on skin rejuvenation for the face and the potential side effects. More than 100 patients were facially injected with PRP prepared using the MyCells® kit. The follow-up was performed over a period of 3 to 6 months following the primary injections.

The methods for this study are described below:

A - In Japan

A total of 172 patients ranging in age from 38 to 72 years old, were treated by Dr. Junichiro Kubota and his staff in Tokyo, Japan. His group included 159 women and 13 men.

B - In the United Kingdom

Dr. Jacques Otto, of London, England, treated 194 patients ranging in age from 42 to 79 years old. The group was comprised of 186 women and 8 men.

C - In Israel

A total of 42 female patients ranging in age from 46 to 74 were treated by Dr. Amos Leviav in his clinic in Tel Aviv, Israel.

1 THE TREATMENT

1 - PLATELET HARVESTING

Ten (10) cc of blood is collected from the patient using the special MyCells tube containing separation gel and anti-coagulant.

After blood collection, the gel tube is gently inverted several times in order to mix the blood and anti-coagulant. The tube is then centrifuged for 10 minutes at 1,300 to 1,500 rpm. All operations are performed at room temperature. Centrifugation will result in 6-7 mls of plasma.

2 – REDUCING PLATELET POOR PLASMA

The tube is then placed in a holder. Using a syringe, equipped with a 10 cm blunt needle, the surface of the plasma layer is aspirated leaving 30 to 40% of the plasma in the tube. During this operation, only part of the platelet poor plasma is removed. The extracted PPP can then be discarded.

Photo 1.

Before. After.

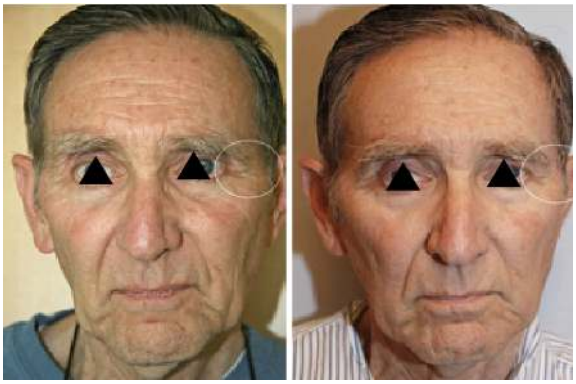

Photo 2.

Before. After.

Photos courtesy by MyCells.

3 –PRP PREPARATION

The same syringe, equipped with a 10 cm blunt needle, is used to resuspend the buffy layer that sits on the gel surface with the remaining plasma. This action will result in a suspended solution known as Platelet Rich Plasma (PRP).

During the resuspension process, the plasma is drawn into the syringe without touching the surface separating gel. The solution is then, gently, expelled into the tube. This is repeated several times with particular attention to the walls and gel surface. The tube is then re-capped and placed on a vortex mixer for 30 seconds. The mixer must be adjusted to a low setting in order to prevent the disruption of the gel layer.

The tube is then placed into the holder and the cap removed. The upper portion of the sterile pouch is then peeled away from the filter tube. The disc end of the filter tube is then inserted into the tube containing the PRP until the disc contacts the gel surface. The PRP will then enter the filter support chamber.

With the 10 cm blunt needle fitted onto a 1 ml syringe, the first volume of Platelet Rich Plasma is removed.. By leaving the long needle in place, additional volumes of PRP can be harvested by changing out the syringes. Each of the 1 cc syringes containing the PRP are fitted with a sterile 30G needle. Place a 30G needle onto the syringe. It is recommended that the PRP injections are made within 10 minutes of harvesting.

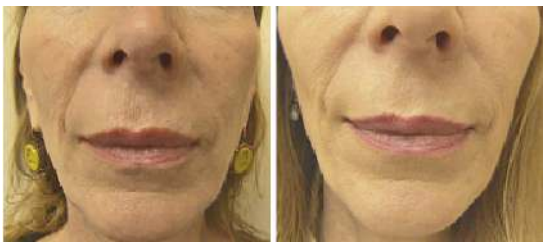

Photo 3.

Before. After.

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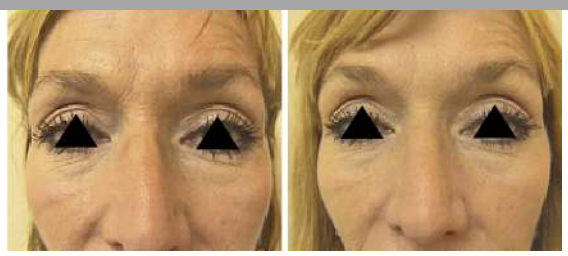

Photo 4.

Before. After.

Photos: results obtained with MyCells

4 – INJECTING THE PRP

The treatments were performed according to the following parameters:
- layer specific transplant
- stretch the skin surface
- needle bevel up
- serial treatments to obtain accumulative effect
- minimal-trauma technique using a long needle

When used for filling, the intradermal injections were performed with a 30G needle This is done in order to fill in the deep folds or wrinkles using either the linear threading technique, the fan technique or the cross hatching technique. It is necessary to perform a slight overcorrection of 20%. The amounts injected vary from 4 to 6 ml for a face, depending on the patient. For superficial injection with the mesotherapy technique, a 32 g needle must be used and the injections must be performed at the surface according to the micro-injection or micro-papular technique. Around 1 to 2 ml of PRP are injected in two layers over the treatment area. Following injection, Auriderm X0 (vitamin K) cream, or its equivalent, may be applied.

2 RESULTS AND FOLLOW-UP

The patients were reviewed at 3 monthly intervals. The results obtained were age-dependent. The younger patients (less than 35 years) were found to respond more quickly. Their main indication was skin rejuvenation and the prevention of skin aging. For this group, treatment every 12 to 24 months is sufficient.

Patients up to 45 years required a second treatment 9 to12 months after the first one, as well as annual booster injections.

Patients aged 50 to 60 years required a second treatment after 6 months, a third one 15 months after the initial treatment, and finally a touch up 2 years after the first treatment.

Patients over 60 years needed a second treatment after 3 months, a third after 9 months, and a fourth treatment a year and a half after the first treatment.

3 CONCLUSION

Compared with other skin rejuventation therapies, the clinical experience using Platelet Rich Plasma (PRP) prepared with the MyCells kit has demonstrated it to be a useful primary or adjunctive therapy for the tissue rejuvenation.

Both superficial and deep dermal applications can result in skin rejuvenation and global facial volumisation. PRP is a form of biostimulation that is safe and creates an immediate, long lasting volumetric effect with natural looking results. The technique is easy to perform and has virtually no side-effects. The PRP injections provided a high level of patient satisfaction. (Photos of the results).

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