The Use of Platelet Rich Fibrin in Facial Esthetics and the Center for Advanced Rejuvenation and Esthetics

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Facial esthetics has become one of the fastest growing industries in the world. While historically, a number of minimally invasive procedures have been utilized effectively in facial esthetics (including Botox, Hyaluronic Acids, and PDO threads), more recently platelet concentrates and lasers have gained momentum owing to their more natural regenerative approach. The main advantage of both is that they offer a safe, easy-to-obtain, and completely immune-biocompatible method for the 'healing/regeneration' of aging skin. This differs significantly from previous modalities which aim to act as 'fillers/paralyzers' and which may initiate a foreign body reaction once implanted within living tissues. As the population continues to age and is more concerned with esthetic appearances, it becomes apparent that dentists play a pivotal role in this domain. The smile has been deemed the number one esthetic feature on an attractive face in key studies on the topic, and the ability to further provide facial rejuvenation/esthetic procedures in a safe and effective manner using platelet concentrations and lasers both minimizes risk to patients and further provides an ability to maintain long-term healthy regenerated skin. This article highlights the recent expansion of a dental office into one offering facial rejuvenation procedures at the Center for Advanced Rejuvenation and Esthetics (CARE Esthetics) and explains the technology offering various before/after photos and videos highlighting their use.

Introduction: Aging skin

Aging skin is an inevitable process that occurs as we gradually get older.[1,2] Several factors have been associated with this process which include both genetic and environmental factors.[3] Exposure to sun, pollution, and various chemicals have been known to cause skin and/or DNA damage speeding the aging process.[3] In general, skin changes and aging skin are more pronounced here in Florida owing to higher exposure to sun. A number of changes to the skin may occur as a result including skin atrophy, telangiectacia, fine and deep wrinkles, yellowing (solar elastosis) and dyspigmentation.[3] Furthermore, a number of additional physical/environment factors including poor diet, lack of exercise, caffeine intake, smoking and drug use are additional factors known to speed the aging process.[4] Obvious signs of aging skin include depressions in the corners of the mouth, cheeks, forehead, eyebrows, eyelids and nose.5 Based on visible differences that occur with aging, a variety of treatment options have been proposed accordingly to favor a more youthful appearance. Hydration and collagen/elastin production are both key features.

Figure 1: Following the use of a centrifugation spin cycle, whole blood is separated into a plasma component rich in growth factors, platelets and leukocytes that may be utilized as a regenerative agent in facial esthetics. (QR code links to video explaining the advancement from PRP to PRF).

A variety of treatment options have been proposed over the years for the aging skin to improve esthetic appearance. This article will focus primarily on platelet concentrate technology. Importantly however, several techniques heavily rely on normal protective mechanisms of the epidermis which can be altered or disrupted following their use. For example, the use of Botox has known secondary effects that may cause a cascade of reactions with potential consequences.[6] While they generally advise repeated injections every 4-6 months or so to maintain facial appearance by temporary denervation and relaxation of muscles by preventing the release of neurotransmitter acetylcholine at the peripheral nerve endings,[7] it may also lead to secondary effects associated with an increased granular layer or thinning of the epidermis as a result of a foreign body reaction to this material.[8,9] Other reported secondary effects include cases of muscle paresis including muscle weakness, brow ptosis, upper eye-lid ptosis, lower eye lid ptosis, lateral arching of the eyebrow, double or blurred vision, loss or difficulty in voluntary closure, upper lip ptosis, uneven smile, lateral lip ptosis, lower lip flattening, orbicularis oris weakness, difficulty in chewing, dysphagia, altered voice pitch and neck weakness. On the other hand, dermal fillers have been associated with over 40 cases of blindness! While it is used practically every day in facial esthetic spas and plastic surgery offices worldwide (as well as within our Center), it is clear that such cases are sure to create some fear within the community, and proper training from the provider is an absolute requirement. It also becomes clear that safer modalities (such as those presented within this article) are constantly being investigated and developed as potential alternatives without bearing pronounced secondary side effects.

Platelet Concentrates

Based on these obvious changes associated with aging, it was proposed several years ago that platelet concentrates could be utilized in facial esthetics to improve collagen synthesis and restore facial tissues.[10-12] Platelet rich plasma (PRP) was the first heavily utilized platelet concentrate shown to specifically favor wound healing and utilized effectively in combination with micro-needling.[10-12] The main function of platelet concentrates is to increase recruitment and proliferation of cells and to further speed revascularization/blood flow towards defective areas. Since the first-generation platelet concentrate (PRP), which was proposed over a decade ago, many advancements have been made.[13] Many devices and isolation kits have been fabricated based on the concept of isolating platelets for regenerative purposes. Their main drawback remained their inclusion of anti-coagulants and their somewhat lengthy preparation protocols. Today, advancements in centrifugation protocols and centrifugation tube characteristics have made it possible to utilize platelet concentrates without anti-coagulants. This second generation platelet formulation, termed platelet rich fibrin (PRF), has formed the basis of over 1000 scientific publications on the topic and has now extended into the field of facial esthetics (Figure 1).[14] This article addresses this topic and introduces the concept of PRF as a safer, more effective regenerative platelet concentrate that circumvents eliciting a foreign body response, owing to its 100% natural composition. Today, basic research studies have demonstrated the better ability for PRF produced utilizing horizontal centrifugation and its superiority over conventional fixed-angle devices (Figure 2).[13] PRF can then either be injected subdermal by creating papules or utilized with micro-needling as highlighted below.

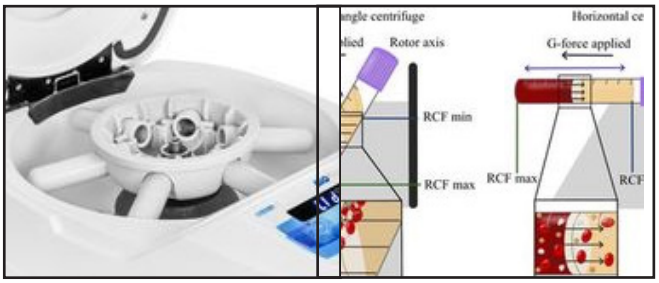

Figure 2: Horizontal centrifugation of PRF leads to up to 4 times greater accumulation of cells and growth factors. (A) Image of a horizontal centrifugation device, while tubes are placed in vertically, upon the spin cycle the tubes gradually rotate horizontally that allows for better layer separation. (B) Illustrations comparing fixed-angle and horizontal centrifuges. With fixed-angle centrifuges, a greater separation of blood layers based on density is achieved owing to the greater difference in RCF-min and RCF-max. Following centrifugation on fixed-angle centrifuges, blood layers do not separate evenly and as a result, an angled blood separation is observed. On a fixed-angle centrifuge, cells are pushed towards the back of centrifugation tubes and then downwards/upwards based on cell density. These g-forces produce additional shear stress on cells as they separate based on density along the back walls of centrifugation tubes. In contrast, horizontal centrifugation allows for the free mobility of cells to separate into their appropriate layers based on density allowing for more optimal cell separation as well as less trauma/shear stress on cells. (QR code explaining horizontal centrifugation).

Subdermal Injections of PRF

In general, PRF can be administered using a skin surface regenerating augmentation (SSRA) technique via three different modalities of injection which treat the skin at three different levels: 1) epidermic level, 2) superficial intradermal level known as papules and 3) intradermic level which is below the dermis and supra-periosteal known as deep mesotherapy (point by point technique). These three techniques serve different purposes as they reach different depths of the skin. Depending on the patient and on the quality of the skin, multiple combination modalities can be applied. Figure 3 demonstrates the use of intra-dermal papule injections that highlight the ease of such a technique which delivers PRF in a very safe modality using a 30 gauge 4 mm needle (Figure 3). These injections allow for a higher delivery of growth factors to specific troubled areas (such as Crow's feet, glabellar lines and deep nasolabial folds).

Figure 3: (A) Use of liquid PRF for facial injections utilizing a tiny 30 gauge 4mm needle. This small needle can then be introduced into fine lines and wrinkles to provide growth factors within (B) the nasolabial folds, (C) crow's feet or any area showing superficial wrinkles. (QR code demonstrating injection techniques with PRF into crow's feet).

Figure 4: (A) Picture of the small handheld DermaPen micro-needling device. (B) Illustration of the DermaPen micro-needling tip. Note that 12 small micro-needles exist in such a device which repeated penetrate within 0.25 to 2.5 mm in depth within facial tissues at roughly 3-5000 RPMs. (QR code demonstrating microneedling with PRF)

Use of PRF with micro-needling

One of the simplest procedures that can also be performed by dental assistants in the office (with proper certification) is that of micro-needling with PRF. In 2005, Fernandes et al. proposed the concept of 'minimally invasive percutaneous collagen induction' ie micro-needling.[15] As the term implies, a number of 'microneedles' (typically 12) are utilized to create minimally invasive, nonsurgical and nonablative therapy of facial tissues. Micro-needling relies on the principle of neovascularization that occurs as a result of minimal trauma causing rapid neocollagenesis and tissue repair. This is performed in an automated fashion with a micro-needling device, ie the 'Dermapen' (Figure 4). The Dermapen is an electrically-powered medical device that delivers a vibrating stamp-like motion to the skin resulting in a series of micro-channels. It is spring-loaded with an adjustment ring allowing for alteration of the heights of the micro-needles at penetration depths ranging from 0.25 to 2.5 mm. These micro-channels are then filled with platelet rich fibrin (PRF) and the device may also be utilized to 'push' a product (in our case PRF) at specific depths within skin to faciliate facial rejunevation via autologous growth factor release.[16]

The advantages of micro-needling are that it is an extremely safe skin resurfacing therapy and results in minimal damage to the skin. The down time is usually approximately 24-48 hours. This method of facial rejuvenation has a much shorter down-time when compared to other comparable methods and lower risk of side effects such as hyperpigmentation and scarring (when compared to lasers, for instance), making it a more ideal treatment choice for all individuals and especially those with thin, sensitive, or ethnic skin types (skin types >III).[17] It is also effective for smokers and other individuals having been exposed to external pollutants.[18]

Several reported advantages have been discussed in the literature for micro-needling.[19] These include:

- Short healing times when compared to other modalities (typically 24-48 hours)
- The technique is easy to master.
- Can be utilized on all skin types where lasers and deep peels cannot always
- Convenient office procedure with minimal overhead cost
- Well tolerated by patients
- Minimal risk of post-inflammatory hyperpigmentation or bruising since the needle depth penetrate the skin a maximum of 2.5 mm.

Before and after pictures are presented in Figure 5 with an accompanying short video highlighting the use of microneedling with PRF for neck tightening.

Figure 5: (A) Clinical photo demonstrating older female patient with pronounced deep facial wrinkles. (B) Results following 4 treatment procedures 1 month apart. Note the substantial reduction in depth of each wrinkle post-op. (C) Male patient (cigarette smoker) with substantial forehead wrinkles. (D) Following 4 micro-needling treatments, note the substantial improvement in facial harmony and reduction in deep forehead wrinkles. (QR code demonstrating micro-needling to tighten the neck).

Adapting Facial Esthetic Procedures in a Dental Practice

One of the key questions commonly asked has been the ability to adapt facial esthetic procedures within a dental practice. Owing to our perceived need to separate both dental and facial esthetics components within our practice, we have successfully re-branded our facial esthetic procedures under the ''Center for Advanced Rejuvenation and Esthetics'' (CARE Esthetics) to support our growing marketing effort towards the community specifically in facial rejuvenation as opposed to our standard dental office name ''Lakewood Ranch Dental''.

By doing so, greater efforts could be placed on understanding the procedures with a dedicated website and marketing material describing their regenerative potential. Owing to the growing success within our practice in Sarasota, many colleagues have shadowed within our office where we have training programs geared towards teaching/facilitating other dentists and colleagues who wish to adapt similar procedures within their offices (www.prfedu.com/followtheexperts). Following completion of adequate training, dentists in other cities are able to join CARE Esthetics and perform similar all natural and safe facial esthetic procedures within their cities and join our national branding efforts at www.care-esthetics.com/locations.

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Figure 1 Figure 2 Figure 3 Figure 4 Figure 5

Florida Focus -Self-Instruction Exercise 06211, Esthetics Subject 780-- 1 CE Credit

The 10 questions for this exercise are based on information presented in the article, "Use of Platelet Rich Fibrin in Facial Esthetics and the Center for Advanced Rejuvenation and Esthetics." Reading the article and successfully completing this exercise will enable you to:

- **review the factors which affect aging skin;**
- **understand the advantages of using platelet rich fibrin to improve esthetic appearance;**
- **understand the differences between intradermal papule injections and micro-needling.**

Please email your answers with your name and AGD number to flagdeditor@gmail.com. In future issues, we hope to enable members to submit their answers online. 80% of the answers must be correct to receive credit. Answers for this exercise must be received by September 30, 2021

1. Changes to the aging skin due to genetic and environmental factors include all the following except one. Which is the exception?

A. Yellowing
B. Cyanosis
C. Telangiectacia
D. Atrophy

2. Secondary effects of Botox can include a decreased granular layer of the epidermis due to a foreign body reaction. Other reported secondary effects include upper or lower eyelid ptosis, double vision, uneven smile, dysphagia, and altered voice pitch.

A. Both statements are true.
B. The first statement is true; the second is false.
C. The first statement is false; the second is true.
D. Both statements are false.

3. Dermal fillers have been associated with _____ cases of blindness.

A. 15
B. 30
C. 40
D. 60

4. Platelet rich plasma (PRP) was the first heavily utilized platelet concentrate shown to _____.

A. specifically favor wound healing
B. be free of anticoagulants
C. allow for rapid preparation
D. All of the above

5. Advantages of Platelet Rich Fibrin include all the following except one. Which is the exception?

A. No foreign body reaction
B. Increased ability to regenerate tissue
C. Free of anticoagulants
D. Long-term use in facial esthetics

6. Today, PRF utilizes vertical centrifugation and has demonstrated its superiority over conventional rotational devices. PRF has been studied in over 1000 scientific articles.

A. Both statements are true.
B. The first statement is true; the second is false.
C. The first statement is false; the second is true.
D. Both statements are false.

7. Papule injections deliver PRF safely using a ___ gauge ___ mm needle.

A. 30; 2
B. 30; 4
C. 32; 2.5
D. 32; 4

8. There are four different modalities of subdermal PRF injections. The first step is to determine which type is most ideal for each patient.

A. Both statements are true.
B. The first statement is true; the second is false.
C. The first statement is false; the second is true.
D. Both statements are false.

9. Micro-needling typically uses _____ needles at penetration depths of _____ mm.

A. 12; 0.25 to 2.5
B. 16; 0.5 to 2.5
C. 20; 1.0 to 2.0
D. 24; 0.5 to 1.0

10. All of the following are advantages of micro-needling except one. Which is the exception?

A. With proper certification, it can be performed by a dental assistant.
B. It has a short healing time of 1-2 weeks.
C. Minimal trauma stimulates rapid collagenesis.
D. It can be utilized for all skin types.

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