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Purpose: Fat grafts have always represented a challenge in inducing the necessary neoangiogenesis, which results in significant resorption. This study was designed to compare the efficiency of first- and second-generation platelet-rich plasmas (PRPs) combined with a fat graft during facial lipostructure surgery.

Methods and Materials: To address the research purpose, the investigators designed and implemented a double-blinded prospective clinical trial. The patients underwent bilateral facial lipostructure, a natural long-lasting method of filling and supporting the face using intricate layers of infiltrated autologous fat. The method involved the use of PRP on 1 side and platelet-rich fibrin (PRF) on the other side. The study population was composed of all patients presenting to the authors’ department for the evaluation and management of facial contouring in the cheek and cheekbone areas from June 2008 through December 2010. The primary predictor variable was the type of combination (PRP/fat or PRF/fat). The outcome variables were the amount of resorption, which was estimated by comparing pre- and postsurgical photographic views, pain, edema, and bruising. The statistical evaluation of the findings was performed using SPSS software. Parametric tests (t test and Levene test) were used to compare the treatment efficacy and complications between the groups.

Results: Twenty-five patients (8 men and 17 women) underwent bilateral facial lipostructure surgery in the cheek and cheekbone areas using PRP and PRF. One year after the operation, a slight esthetic asymmetry was noticeable, with greater average resorption on the PRP/fat side.

Conclusions: This first comparative clinical study highlights the value of using concentrated platelets for adipocyte grafts. The results suggest that the combination of fat and PRF is more effective than the combination of fat and PRP in the context of facial lipostructure surgery.

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Fat grafts have always represented a challenge in inducing the necessary neoangiogenesis, which can result in significant resorption. The use of a nonreabsorbable, exogenic material such as silicone was introduced as early as the 1950s, but was suspended years later because of harmful effects (migration, granulomas). Hyaluronic acid fillers and other formulations are popular, but absorb quickly, and the use of large volumes presents cost issues. Facial lipostructure surgery is a natural, long-lasting method of filling and supporting the face by using intricate layers of infiltrated autologous tissue. This method allows the tissues to be sculpted for the 3-dimensional augmentation of facial elements, as described by the Ameri-
can plastic surgeon Dr Sydney Coleman to address the issue of resorption.

The fat tissue is centrifuged before reinjection, which means it can be sufficiently broken apart without damaging the adipocytes to stimulate the new synthesis of an extracellular matrix and to facilitate colonization of the graft by endothelial cells. This centrifugation stimulates the preadipocyte cells, which allows for the reconstruction of the grafted tissue. Similar to the Latin expression, *destruam et aedificabo*—"I destroy and I build up"—Coleman’s technique requires the decomposition of pre-existent tissue to allow for in situ reconstruction. Growth-inducing agents to improve the sustainability of adipocyte grafts have never really been developed. The grafted adipocytes, being highly differentiated, are not sensitive to the triggers of proliferation likely to be induced by these molecules. The main clinical protocols, which allow the use of autogenously growth-inducing agents, generally involve the use of a platelet concentrate.

The platelets used in oral, maxillofacial, and plastic surgery are generally grouped as concentrated platelet-rich plasma (PRP). According to the literature, many protocols exist, but all are supported by specific methods originating from fibrin glues, which are not uncommon in oral and maxillofacial surgery. The clinical effects of PRP are not that different from those usually produced by fibrin adhesives, which suggests that perhaps a fibrin matrix is more effective than platelet cytokines, which are widely distributed in this biological adhesive. The fibrin matrix has a proficient homeostatic effect on any diffuse bleeding of the parenchyma and decreases the degree of pain and postoperative edema, which results in improved angiogenesis.

For medicolegal reasons related to blood handling, PRP protocols have not been developed in France. The platelet-rich fibrin (PRF) technique was developed by Choukroun in 2001. The PRF technique is simple: blood is taken without an anticoagulant from a 10-mL tube and then centrifuged directly using moderate forces (400 g). In the center of the tube, a fibrin clot is formed; this clot contains most platelets and leukocytes in the tube. The clot can be used as filling material; it can be cut into small pieces and mixed with a graft (usually with osseous grafts), or it can be pressed between 2 swabs after removing the serum to preserve the membranes (used in oral surgery and tympanoplasties). When mixed with an osseous graft, the PRF is used to biologically bond the grafted particles, and the fibrin matrix leads to vascularization of the graft. The mature adipocytes are not that sensitive to the platelet cytokines, but the incorporation of fibrin clots to the fat mass allows for improved graft vascularization.

The purpose of this study was to evaluate first- and second-generation PRPs combined with a fat graft during facial lipostructure surgery. The investigators hypothesized that PRF would be more effective because of its biochemical structure. The specific aim of the study was to compare fat resorption between the groups.

**Methods and Materials**

To address the research purpose, the investigators designed and implemented a double-blinded prospective clinical trial. Patients underwent facial lipostructure surgery with the use of PRP on 1 side of the face and PRF on the other side of the face in combination with a fat graft. The treatment side was chosen randomly. The study population was composed entirely of patients who presented voluntarily to the authors’ department for the evaluation and management of facial contouring from June 2008 through December 2010. To be included in the study sample, patients had to undergo isolated facial lipostructure surgery in the cheek and/or cheek bone (malar) areas.

The following patients were excluded as study subjects: those who were unwilling to accept risks; those in whom additional procedures such as a cervicofacial facelift or blepharoplasty would be necessary; those in whom similar procedures had been performed previously; those with compromising systemic conditions (eg, platelet dysfunction syndrome, critical thrombocytopenia, hemodynamic instability, sepsis, a history of local or systemic corticosteroid consumption, platelet count <105/μL, hemoglobin level <10 g/dL, and active symptoms of local infection at the site of the procedure); and those with a history of addiction or dramatic weight loss or gain during the previous month.

The primary predictor variable was the type of combination (PRP/fat or PRF/fat). The primary outcome variables were the amount of resorption (which was estimated by comparing pre- and postsurgical [1 mo and 1 yr later] photographic views), pain, edema, and bruising. Variables such as gender and age had no significant impact on this research because the procedure was performed as part of a cross-sectional study, and the comparison between the 2 groups was performed under similar conditions as in 1 patient.

All the steps of fat harvesting (site and technique), fat preparation, and fat injection techniques were carried out in all patients by a single clinician according to the protocols described by Coleman. The volumes of the injected mixtures (PRP/fat and PRF/fat) were equal: 8 mL per cheekbone and 7 mL per cheek, on average.
The types of preparation kits and centrifuges used for the PRP and PRF were similar in all patients. For better time management and to ensure the scientific validity of the measurements, a single clinician was responsible for the preparation of the PRP and PRF and the combination of these platelet concentrates with harvested fat. For the evaluation of photographic views with minimal errors, all photographs were taken in a similar fashion by 1 photographer and at the same photographic center to identify changes in the cheek and cheekbone areas (Fig 1). To decrease the effect of postoperative edema during the facial analysis (Fig 1), the first photographic views were obtained 1 month after the operation, and the second

**FIGURE 1.** (Cont’d) Schematic view of the photographic analysis. A, For cheekbone area evaluations in the profile views, 4 reference lines were used: the oral commissure to the lateral canthus; the ala to the tragus; the line tangent to the infraorbital rim; and the nasion to the subnasal point. The first 3 lines determined the ideal location for the malar augmentation and were used before the injection to mark the site of the procedure and aid in the evaluation after surgery. Then, the most projected point of the cheekbone area was determined on the profile views as a reference point, and a perpendicular line was drawn from this point to the line connecting the nasion to subnasal point on the left and right profile views of each patient. After malar augmentation, the length of the perpendicular line shortened because of anterior displacement of the most projected point of the cheekbone area on the profile views; this line lengthened incrementally after resorption. The measurement of these differences indicates the amount of augmentation and resorption. B, For the cheek area, pre- and postoperative frontal views were superimposed with the aid of tracing paper. The 5 reference points used for this comparison were the most projected point of the face (nose), the most projected point of the chin, the radix, and the left and right lateral canthus. The red line indicates the preoperative position of the cheek area, the yellow area indicates the remaining fat 1 year after surgery, and the blue area indicates the amount of resorption 1 year after the operation. The total amount of augmentation was determined by comparing the preoperative and postoperative views, which were taken 1 month after the operation (blue and yellow areas), and the amount of resorption was determined by the correlation of the 2 postoperative views (blue area). AL, ala; CH, most projected point of the chin; LLC, left lateral canthus; MP, malar projection; N, nasion; OC, oral commissure; OR, infraorbital rim; R, radix; RLC, right lateral canthus; SN, subnasal; T, most projected point of the tip (nose); TR, tragus.

photographic views were obtained 1 year after the operation. The percentage of resorption was estimated by comparing the preoperative and postoperative photographic views (Fig 1). The amount of augmentation was determined by comparing the preoperative and postoperative views, which were taken 1 month after the operation (Fig 1). The amount of resorption was determined by comparing the 2 postoperative views (Fig 2, 3).

DATA COLLECTION AND ANALYSIS
The results of procedures such as facial lipostructure surgery are difficult to evaluate completely and objectively. It is also difficult to evaluate the amount of fat resorption without performing pre- and postoperative magnetic resonance imaging. Therefore, the authors designed a 2-dimensional facial analysis based on the profile and frontal photographic views (Fig 1). Statistical evaluation of the findings was performed using SPSS 16.0 (SPSS, Inc, Chicago, IL). Parametric tests (t test and Levene test) were used to compare treatment efficacy and complications between the groups. The significance level of statistical hypotheses was set at .05 (statistically significant).

FAT PREPARATION
The lipostructure surgery was carried out according to the protocols described by Coleman.1-3 Fat tissue was extracted from the inner side of the knees and was supplemented with a paraumbilical extraction if necessary (Fig 2). The extraction was performed using a specific aspiration nozzle with a diameter of 3 mm and length of 15 cm, with the foam ends and openings at the 2 sides. A 10-mL syringe was screwed onto the nozzle. A vacuum was created in the syringe manually and gradually to avoid the buildup of pressure that could harm the adipocytes. There were multiple drainage tubes to decrease trauma and bleeding. On average, 60 mL of fat was extracted; there were variations among patients based on the indication and quantity needed for the reinjection (Fig 2). The next step of the purification process involved the centrifugation of extracted tissue. The 10-mL syringes were sealed using stoppers and placed in the centrifuge. Centrifugation was carried out for 3 minutes at a speed of 3,000 rpm. After centrifugation, the contents of the syringe were divided into 3 layers.

1. The upper oily sample of adipocytes consisted of triglycerides from the damaged adipocytes and had the lowest density. This part, usually eliminated, was kept to humidify the membranes with the PRF.
2. The bottom sample contained primarily blood debris, which was eliminated when the syringe was withdrawn.
3. The middle sample contained the adipocytes, which were grafted.

On average, the graft occupied a volume of 6 mL in the syringe. After purifying the fat, it was transferred to 1-mL syringes without coming into contact with air.

COMBINATION OF PRP AND FAT
After fat harvesting and processing, the PRP was prepared with a small volume of blood that had been taken from a peripheral vein and then centrifuged. Because the secretion of the growth factor begins with platelet activation, protocols usually use Ca2+ to induce platelet activation and exocytosis of α-granules. Calcium also acts as an essential cofactor for platelet aggregation.4,5 After activation with CaCl, the platelet gel was added to the fat tissue within 4 to 5 minutes while it remained in the liquid form at a ratio of 1:9 or 1:10. When the PRP is in liquid form, it can be added easily to the adipose tissue. This approach is recommended because of the risk of spills when using a 10-mL Luer-Lock syringe (Alvaz, Khouzestan, Iran) that contains centrifuged fat tissue. Conversely, when the PRP is in solid form, spilling it into a syringe containing centrifuged fat is difficult because the plunger of the syringe containing the PRP is hampered by the strong consistency of the PRP, which prevents leakage through the needle.4,5

COMBINATION OF PRF AND FAT
To obtain the PRF, 40 to 60 mL of venous blood was taken in 4 to 6 tubes without an anticoagulant (10 mL; Vacationer, Becton Dickinson, Texarkana, Texas). These were immediately centrifuged for 10 minutes at 3,000 rpm according to the protocol described by Choukroun et al.6-8

The activation of coagulation and centrifugal forces creates 3 layers in the tube: a red blood corpuscle base at the bottom, acellular plasma at the surface, and a clot of fibrin PRF containing many platelets in the middle. The PRF clots were collected using forceps. These were separated from the red blood corpuscle base and placed into a cup. The fibrin PRF clot was cut in fragments of 1 to 2 mm, which were mixed with the oil sample produced by the fat centrifugation. This mixture was put into a 1-mL syringe and injected using a nozzle (in line with the tunnelization method of Coleman2,5) at the principal sites to be grafted before the instillation of the purified fat. Once cut and mixed, each clot represented an injected volume of approximately 1 mL, comprising equal parts fibrin PRF matrix and liquid (plasmatic serum and purified adipocyte sample).3 On average, 4 to 6 clots of PRF are sufficient to treat a complete face: 6 clots for
completing the lipostructure surgery and 4 clots for lipostructure surgery in combination with a cervico-facial facelift. A deposition of the PRF before the injection of the fat grafts was used for preparing and activating the graft site. Based on the techniques of Coleman,2,3 the grafted tissue was added gradually in small amounts with each passage of the nozzle. Cannulas of various forms and lengths were used—all with a smooth stump to decrease the risk of hematoma and with lateral injecting apertures to avoid an intravascular injection. It is important to perform extensive tunneling; all layers were grafted and started at the deepest point, and the incisions were closed using 6-0 nylon sutures. Pretreatment of the graft site with the PRF was performed unilaterally.

On the other side, the PRP/fat was used for the facial lipostructure surgery. There were 2 main sites

![Figure 2](image_url)

**FIGURE 2.** Fat graft, platelet-rich plasma, and platelet-rich fibrin preparation procedures: A, Fat harvesting; B, fat centrifugation; C, prepared platelet-rich fibrin; and D, prepared platelet-rich plasma.

of injection: the cheekbones and the cheeks. Each zone received, on average, 8 mL per cheekbone and 7 mL per cheek. The postoperative evolution of the patients was followed for 1 month and 1 year after surgery through clinical examination and photographic analysis. This research was approved by the local institutional review board and was in compliance with the World Medical Association Declaration of Helsinki as it relates to medical research protocols and ethics.

Results

From June 2008 through December 2010, 25 patients (8 men and 17 women) underwent bilateral facial lipostructure surgery (Coleman method) in the cheek and cheekbone areas using the PRF and/or PRP in combination with a fat graft. The patients’ ages ranged from 24 to 69 years (average age, 45 years).

In this research, the use of PRF and PRP did not require retreatment because all but 1 patient was satisfied with the results (Figs 4, 5). One month after the surgery, the average amount of augmentation was 7.4 mm (5 to 9 mm) in the PRP/fat group and 7.48 mm (5 to 9 mm) in the PRF/fat group ($P > .05$).

One year after the surgery, the average amount of resorption was 1.376 mm (0.5 to 3 mm) in the PRP/fat group and 0.896 mm (0.5 to 1.5 mm) in the PRF/fat group ($P < .05$). The average percentage of resorption was determined by dividing the average amount of resorption by the average amount of augmentation. This value was higher in the PRP/fat group (18% vs 13%; $P < .05$; Table 1).

Augmentation was performed in the cheekbone area in 13 patients (52%) and in the cheek area in 12 patients (48%). Maximum resorption was observed in the cheek area in the PRP/fat group (33%); the lowest amount of resorption (10%) was observed in the PRF/fat group. The average amount of resorption was greater in the cheekbone area (1.3 vs 0.95 mm; $P < .05$).

In this study, there was no case of a massive edema, prolonged bruising, or severe pain. Undercorrection was the most frequent complication. No significant difference was observed for gender or age.

Discussion

The purpose of this study was to evaluate first- and second-generation PRPs combined with fat grafting during facial lipostructure surgery. The investigators hypothesized that the PRF would be more effective because the PRF clot forms a strong fibrin matrix with a complex 3-dimensional architecture and, unlike the PRPs, the Choukroun PRF does not dissolve quickly after application. The specific aim of the study was to compare fat resorption between these groups. Notably, evaluating the 3-dimensional amount of fat resorption without performing pre- and postoperative magnetic resonance imaging is difficult. According to the present facial analysis (Figs 1, 2) and clinical evaluation, the degree of resorption was insignificant; there was no massive resorption requiring a secondary lipostructure, except in 1 case. In the patients who were treated with the PRP/fat and PRF/fat techniques, a slight esthetic asymmetry was noticeable, with more resorption on the PRP/fat side. The average amount of resorption was greater in the cheekbone area (range, 10% to 33%).

**FIGURE 3.** A 32-year-old man A, before and B, 1 year after malar augmentation. The perpendicular line (white line) is longer before than after the malar augmentation (black line).

At the end of 4 weeks, a significant percentage (approximately 10%) of patients presented with edema and approximately 6% with bruising. In the present study, there was no case of massive edema, severe pain, or prolonged bruising. Indeed, the deposition of a fibrin matrix in the grafted areas allows improved angiogenesis and thus superior vascular and lymphatic drainage; the risks of bruising and edema also may be decreased. Undercorrection was the most frequent complication, perhaps due to an underestimation on the part of the surgeon at the time of the intervention or an excess adipocyte-mediated resorption.
Augmentation (mm) considerably during the previous decade. Platelets surgery and is immediately processed by centrifugation. Collected with an anticoagulant just before or during techniques have some points in common: blood is different systems and protocols. All available PRP which does not allow for a distinction among the name as the original transfusion platelet concentrate, protocols, kits, and centrifuges. The development of a wide range of preparation protocols have spurred commercial exploitation with true clinical benefits in some cases. Indeed, these growth factors to enhance healing is an interesting remodeling, and angiogenesis. The use of these factor, which can stimulate cell proliferation, matrix contain large quantities of key growth factors, such as platelet-derived growth factor-AB, transforming growth factor-β1, and vascular endothelial growth factor, which can stimulate cell proliferation, matrix remodeling, and angiogenesis. The use of these growth factors to enhance healing is an interesting option, but commercial interests might obscure a lack of true clinical benefits in some cases. Indeed, these concepts have spurred commercial exploitation with the development of a wide range of preparation protocols, kits, and centrifuges.

Most of these products were called PRP, the same name as the original transfusion platelet concentrate, which does not allow for a distinction among the different systems and protocols. All available PRP techniques have some points in common: blood is collected with an anticoagulant just before or during surgery and is immediately processed by centrifugation. The time for platelet concentrate preparation is variable but is always completed within 1 hour. The first centrifugation step is designed to separate the blood into 3 layers: red blood cells are found at the bottom, acellular plasma (platelet-poor plasma) is in the supernatant layer, and a “buffy coat” layer of concentrated platelets appears between. The next steps vary in the numerous protocols but are an attempt to discard the red blood cell layer and the platelet-poor plasma to collect only the buffy coat layer. The platelet concentrate obtained is applied to the surgical site with a syringe, with the combination of thrombin and/or calcium chloride (or similar factors) to trigger platelet activation and fibrin polymerization. The Choukroun PRF is the latest version of this protocol; blood is collected without the use of an anticoagulant and centrifuged immediately. A natural coagulation process then occurs and allows for the easy collection of a leukocyte-rich clot, without the need for any biochemical modification of the blood; that is, no anticoagulant, thrombin, or calcium chloride is required. This open-access technique is the simplest and the least expensive protocol developed thus far. However, some confusion is likely because different suppliers use a similar nomenclature for their distinct products (such as Vivo Stat PRF (Denmark) and Fibrinet Platelet-Rich Fibrin Matrix, Cascade Medical Enterprises, UK).

Three main sets of parameters are necessary for a clear classification of platelet concentrates. The first set of parameters relates to the preparation kits and centrifuges used. The size of the centrifuge (parameter A1), the duration of the procedure (parameter A2), and the cost of the device and kits (parameter A3) are significant factors when considering the repetitive use of these techniques in daily surgical practice. The ergonomics of the kit and the complexity of the procedure (parameter A4) are also key parameters, because complex procedures are in danger of being unusable or potentially misused, leading to irreproducible results. For these reasons, automated systems have been developed and are commercially available. These parameters define the practical characteristics of each technique. The second set of parameters relates to the content of the concentrate. The final volume of usable concentrate (parameter A1) depends on the initial blood harvest and can define the potential clinical applications of a preparation protocol. The efficiency in collecting platelets (parameter B2) and leukocytes (parameter B3) and their preservation throughout the entire process (parameter B4) define the basic pharmacologic relevance of the product and indicate its potential applications. The third set of parameters relates to the fibrin network that supports the platelet and leukocyte concentrate during its application. The density of the fibrin

### Table 1. GROUP STATISTICS: AVERAGE AMOUNT OF FAT RESORPTION AFTER 1-YEAR FOLLOW-UP

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>SEM</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRF + fat graft</td>
<td>25</td>
<td>7.5</td>
<td>1.2</td>
<td>0.2</td>
<td>.823</td>
</tr>
<tr>
<td>PRP + fat graft</td>
<td>25</td>
<td>7.4</td>
<td>1.3</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Resorption (mm)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PRF + fat graft</td>
<td>25</td>
<td>0.9</td>
<td>0.3</td>
<td>0.6</td>
<td>.000</td>
</tr>
<tr>
<td>PRP + fat graft</td>
<td>25</td>
<td>1.4</td>
<td>0.5</td>
<td>0.1</td>
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</tbody>
</table>

Abbreviations: PRF, platelet-rich fibrin; PRP, platelet-rich plasma; SD, standard deviation; SEM, standard error of the mean.

network is determined mainly by the concentration of the fibrinogen (parameter C1) during preparation. Most protocols lead to the creation of a low-density fibrin gel, which allows for convenient surgical application but lacks a true fibrin support matrix. In contrast, a high-density fibrin network means that the platelet concentrate can be considered a biomaterial, and the fibrin matrix itself might have potential healing effects. The fibrin polymerization process (parameter C2) needs to be evaluated, taking into account the ratios between fibrinogen and thrombin concentrations and the biomechanical properties of the final fibrin network. Fibrinogen is activated by thrombin, which initiates polymerization into fibrin. However, the fibrin fibrillate can be assembled in 2 different biochemical architectures: by condensed tetramolecular or bilateral junctions or by connected trimolecular or equilateral junctions. Bilateral junctions are created by a drastic activation and polymerization with, for example, high thrombin concentrations. This process leads to a dense network of monofibers similar to a fibrin glue, which is not particularly favorable to cytokine enmeshment and cellular migration. In contrast, a low level of physiologic fibrin polymerization yields a larger percentage of equilateral junctions, which allows for the establishment of a flexible fibrin network with a multiferiber assembly that can support cytokine enmeshment and cellular migration. Moreover, this organization provides elasticity to the fibrin matrix comparable to that of a solid biomaterial. Fibrinogen collection efficiency and polymerization type define the material characteristics of the concentrate. Using these sets of parameters, actual available methods can then be classified in 4 main categories, depending on the pharmacologic (B parameters) and material (C parameters) characteristics of the obtained product: pure PRP, leukocyte-rich PRP, pure PRF, and leukocyte-rich PRF (or Choukroun PRF). In each category, the concentrate can be produced by different processes (A parameters) through the use of a fully automatized setup or manual protocols.

New issues have arisen for the selection of the most appropriate face rejuvenation methods. There are many publications on the use of fat grafts in plastic surgery. Guerrerosantos et al. reported the use of fat tissue in patients affected by Romberg syndrome and facial defects. Based on the degree of facial tissue depression, they separated their cases into 4 types. For types 1 and 2, they used only fat grafts; for types 3 and 4, they used a combination of cartilage and bone graft, free dermis fat graft, or galeal flaps, depending on the case. The authors also recently reported some interesting cases treated with rhetydoplasty combined with pursing plication suspension sutures and lipoinjection. This combination of procedures provides a 3-dimensional esthetic improvement in contour and volume, has a short convalescence and recovery time, and offers less risk for complications, especially those cases involving the facial nerve. Currently, the lipostructure technique is an alternative to the mid-facelift, augmentation malarplasty, or augmentation genioplasty with prostheses. Lipostructure evolved from lipofilling and is better known as the Coleman technique.

Notably, platelets isolated from peripheral blood are an autologous source of growth factors. When platelets, in a concentrated form, are added to graft materials, the outcome is more predictable. PRP is an easily accessible source of growth factors that support bone and soft tissue healing. The use of PRP in place of recombinant growth factors has several advantages: growth factors obtained from platelets not only have their own specific effect on tissues, but also interact with other growth factors, resulting in the activation of gene expression and protein production. Therefore, the properties of PRP are based on the production and release of multiple growth and differentiation factors at platelet activation. These factors regulate and stimulate the healing process, and they play an important role in regulating cellular processes such as mitogenesis, chemotaxis, differentiation, and metabolism. In general, platelet concentrates are blood-derived products used for the prevention and treatment of hemorrhage due to serious thrombopenia. PRP is an autologous modification of fibrin glue, which has been described and used in various applications with apparent clinical success. PRP obtained from autologous blood is used to deliver growth factors in high concentrations to the sites of bone defects or a region requiring augmentation. The clinical effects of PRP are similar to those usually produced by fibrin adhesives, which suggests that a fibrin matrix may be more effective than platelet cytokines, which can distribute widely throughout this biological adhesive. It has a proficient homeostatic effect on any diffuse bleeding of the parenchyma and decreases pain and postoperative edema, resulting in improved angiogenesis. The Choukroun PRF protocol is a simple and free technique developed in France by Choukroun et al. The product can be considered a second-generation platelet concentrate because the natural concentrate is produced without any anticoagulants or jellifying agents. Venous blood is collected in dry glass tubes and centrifuged at low speed (Process Protocol, Nice, France). In the absence of anticoagulants, platelet activation and fibrin polymerization are triggered immediately.

The PRF clot forms a strong fibrin matrix with a complex 3-dimensional architecture, in which most platelets and leukocytes from the harvested blood are concentrated. When pressed between 2 pieces of
significant resorption (reaching 50% to 70%) can occur. This first comparative clinical study describes the utility of concentrated platelets in patients receiving adipocyte grafts. The PRF is a platelet concentrate and can be produced quickly and easily at minimal cost using only a natural blood clot without biochemically modifying the blood. The present results appear to indicate that a PRF/fat combination is more effective than a PRP/fat combination, although more studies might be needed. The major disadvantages of PRF/fat compared with PRP/fat are the lack of a fibrin PRF clot and the difficult injection technique. With this knowledge of the extended utility of surgical additives containing fibrin in maxillofacial plastic surgery, biomaterials that facilitate cicatrization such as PRF and PRP will be used more broadly in the future, even if it is still necessary to carry out further studies to validate the associated indications.

The quality and stability of the graft through time are the most difficult factors to control because significant resorption (reaching 50% to 70%) can occur. This first comparative clinical study describes the utility of concentrated platelets in patients receiving adipocyte grafts. The PRF is a platelet concentrate and can be produced quickly and easily at minimal cost using only a natural blood clot without biochemically modifying the blood. The present results appear to indicate that a PRF/fat combination is more effective than a PRP/fat combination, although more studies might be needed. The major disadvantages of PRF/fat compared with PRP/fat are the lack of a fibrin PRF clot and the difficult injection technique. With this knowledge of the extended utility of surgical additives containing fibrin in maxillofacial plastic surgery, biomaterials that facilitate cicatrization such as PRF and PRP will be used more broadly in the future, even if it is still necessary to carry out further studies to validate the associated indications.

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