Indications for Platelet-Rich Fibrin Membrane (Prf) in Root Coverage. Case Report

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Abstract
The use of soft tissue substitutes is of fundamental importance in clinical practice, since autogenous gingival grafting, considered the gold standard, has numerous limitations. Currently, platelet-rich fibrin matrices (PRF) have been gaining prominence in the scientific community, because they are obtained from the patient's own blood and eliminate the risk of disease transmission, with unlimited availability, in addition to their regenerative potential, which includes the release of growth factors. In view of these advantages, the aim of this study was to use PRF to gain gingival tissue thickness and obtain root coverage following the tunnel technique. At 180 days after surgery, a healthy appearance (color, texture and anatomy) was observed on clinical examination, with an increase in gingival tissue thickness and about 2 mm of height in the intervened teeth, albeit with partial recapture. According to the clinical results presented, we can see that the use of Platelet Rich Fibrin (PRF) in Periodontics can improve root coverage in cases of multiple gingival recession, albeit discreetly. It is a promising alternative to replace autogenous gingival grafting, especially in situations where the amount of donor tissue is insufficient to repair large areas.
Keywords: Platelet Rich Fibrin (PRF). Autogenous Gingival Graft. Biocompatible Materials.

1. Introduction

The desire for satisfactory aesthetics has been increasing on the part of patients, and one of the requirements to achieve this goal is the maintenance of soft tissues and bone in the oral cavity. Currently, the maintenance of periodontal structure is one of the main challenges in oral rehabilitation[1]. Several techniques have been used for the treatment of periodontal defects in an attempt to solve this challenge, including the use of biomaterials[2].

In the search for the ideal biomaterial, in 2001 Professor Joseph Choukroun, a French physician, together with his team, introduced platelet-rich fibrin or autologous leukocyte fibrin (PRF) into dentistry, known as the second generation of PRP (platelet-rich plasma)[3].

The suggestion was to utilize PRF principles in an improved manner, while omitting the need for anticoagulants, resulting in a regular clotting process that encompasses the production of fibrin, discharge of growth factors derived from platelets and leukocytes, creation of fresh blood vessels, and proliferation of cells.In addition to the difference mentioned, in PRF the effect of releasing growth factors is slow and gradual, with a peak in 7 to 14 days, while in PRP the same process occurs between 4 and 6 hours[4].

Currently, PRF is being widely indicated in regenerative treatments of soft tissues and bones in the oral cavity, including the filling of fresh alveoli after extraction; treatment of perforation of the maxillary sinus membrane; periodontal surgeries; the coverage and protection of granular and block grafts. The aim is to accelerate the regeneration process, restoring form, structure and function, and can be used alone or in association with other biomaterials[5].

The main advantages of using PRF are, for example, not having a risk of disease transmission, since the donor is the patient himself; use only one surgical area; availability of a relatively large amount of the material; Produce flexible membranes with good strength. However, the cost of preparing the material remains high and blood collection must be performed by a trained professional[6]. In addition, its origin comes from the patient's own blood through a centrifugation process that aims to separate the red blood cells from the other parts of the blood and extract the components that will help in the repair process. Through this physiological process of

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coagulation that occurs at the end of centrifugation, the result will be a fibrin clot plus growth factors derived from platelets and leukocytes. The preparation of the PRF is carried out according to the following steps:
1) Blood collection: 10 ml siliconized glass collection tubes with red stoppers, without additives;
2) Wait 3 minutes from collection to start centrifugation;
3) Centrifugation: a centrifugal force sufficient will be performed to separate the elements from the blood, providing the capture of leukocytes and platelets in the plasma fibrin. Generally, for an average of 400grs of material, the centrifugation force is 3,000 RPM for 12 minutes, but this time will depend on the grammage and the orientation of the manufacturer;
4) Membrane flattening: wait 30 minutes after centrifugation and flatten the membrane, which can be done with metal or glass, which will be placed on the membrane. The thickness of the membrane is determined by time, the longer, the thinner and less hydrated the membrane will be. This time varies from 1 to 2 minutes;
5) Accommodation of the membrane in the receiving bed: it is used in the form of a membrane composed of head, body and tail. The head contains the red corpuscle and platelets intermingled in the fibrin matrix, being the area of greatest cell concentration should always be placed in the region that needs to have the greatest tissue gain. The body contains regions with platelet accumulations trapped in the fibrin matrix. The tail is composed of an acellular fibrin matrix (gel), which serves rather as a mechanical barrier6.
Taking into account the advantages of PRF as well as the scarcity in the literature on the indications in periodontal surgical procedures of the material, this work aims to demonstrate through a clinical case the application of PRF in root coverage.

2. Materials and Methods

The following research is a qualitative study because we visually interpret the results of a clinical case. Descriptive because a protocol was provided for the use of PRF in root cover. Applied by which a technique for treatment of gingival recession is described, demonstrating with the presentation of a clinical case the simple and effective technique used in this study7,8,9.
Specifically, a bibliographic review was carried out where documents published in the last five years that include information related to the subject were considered, however, some original articles from years prior to 2018 have also been included due to their scientific relevance. The search was done by consulting the database of, PubMed, MedLine and Scielo, it was also used in the Google Scholar search engine, making use of keywords such as: Platelet rich fibrin (PRF). Autogenous gingival graft. Biocompatible materials10,11.

3. Results

Clinical case

A 46-year-old Caucasian patient came to the clinic with a cosmetic complaint of an exposed root without painful symptoms.
On clinical periodontal examination, he was diagnosed with grade I Miller recession in teeth 13, 14, and 15 with recession of 4 mm, 7 mm, and 6 mm, respectively (Figure 1). With this diagnosis, it was decided to treat the root plate surgically with a PRF membrane using the tunneling technique.

Figure 1. Preoperative appearance of the region to be operated teeth 13, 14 and 15

Figure 2. Collection of patient blood

To produce a PRF membrane, 2 blood collection tubes were used (Figure 2 and 3), this material was centrifuged for 12 minutes and left to stand for 30 minutes. The membrane was then pressed onto a glass plate for about 1 minute to give it a uniform thickness (Figure 4). The surgical procedure was initiated simultaneously with blood collection and intra- and extraoral antisepsis with 0.12% and 2% chlorhexidine digluconate, respectively. Subsequently, the superior alveolar median nerve was anesthetized with 2% mepivacaine.

Figure 3. Patient blood collection device

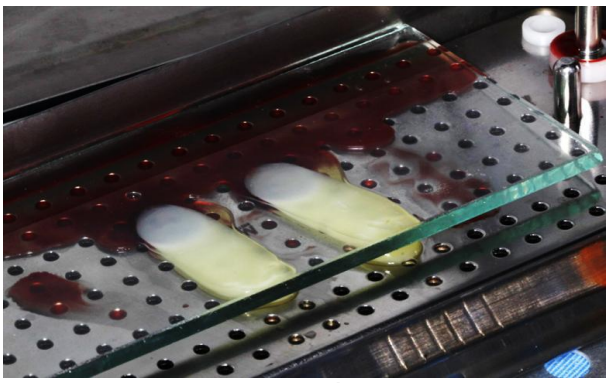

Figure 4. Compression of the PRF membrane

A Beavers blade and rod (Neodent, Brazil) were used to make an incision using the tunnel technique, that is, intrasuccular from tooth 13 to tooth 15, trying to preserve the integrity of the papillae. The flap was carefully divided above the mucogingival line (Figures 5 and 6). Next, two PRF membranes were used and placed under the split flap. Using a thread attached to one end of the membrane, it moved along the entire length of the surgical bed until it was correctly positioned on the teeth with gingival recession (Fig. 7).

Figure 5. Intrasuccular vestibular incision of teeth 13, 14, and 16

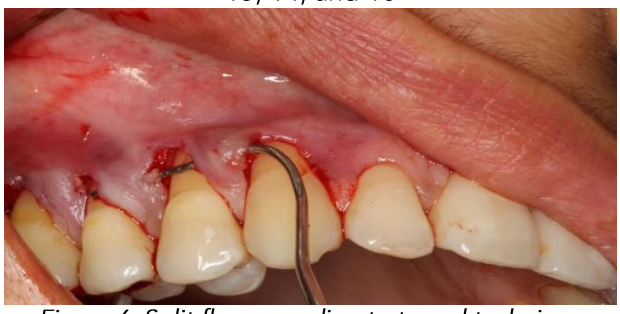

Figure 6. Split flap according to tunnel technique

Figure 7. Slide the PRF membrane with the help of a suture thread over the receiving bed.

The suture was made by joining flap, membrane and periosteum, by means of a single point at each end with absorbable thread Vycril - polyglactin 910, violet, braided, n° 6-0 (Figure 24) (Ethicon® - Johnson & Johnson).

Figure 8. Sutured graft

The prescription consisted of NSAIDs for 5 days and 0.12% chlorhexidine digluconate mouthwashes twice daily for a period of 10 days. The patient received postoperative instructions and was instructed to return for removal of stitches after 10 days. The patient was followed up at 30 and 180 days postoperatively (Figure 25 and 26), with a decrease in recessions observed in teeth 13, 14 and 15 at 3mm, 5mm and 4mm, respectively.

Figure 9. Postoperative clinical appearance of 30 days on the right side.

Figure 10. Clinical appearance of the right side at 180 days postoperative

4. Discussion

Periodontal disease, even after adequate treatment, leaves in some cases a series of consequences, such as loss of insertion, gingival recession, loss of keratinized mucosa and bone tissue, which leads to defects that compromise aesthetics and function12. The use of soft tissue substitutes is of fundamental importance in clinical practice, as autogenous gingival grafting, considered the gold standard, has important limitations. The palate is the most used donor area; However, the limited amount of donor tissue, as well as postoperative discomfort, limit indications for its use. Due to these disadvantages, research with new biomaterials is relevant to evaluate autologous gingival graft substitutes capable of forming "biocompatible systems" with the tissue to be regenerated and with the advantage of eliminating a second surgical area (donor bed),

shortening the time of surgery, providing greater comfort to the patient, reducing postoperative morbidity and an unrestricted tissue supply8 . Among the treatments to overcome these multiple limitations are targeted regeneration therapies, both bone and soft tissue, root coverage with or without connection to grafts, matrices, autologous platelet aggregates, among others13.

The materials for the mentioned therapies can be mainly of allogeneic or xenogenic origin with promising results; and PRF membranes are now gaining prominence in the scientific community. PRF arrays are derived from the patient's own blood, which eliminates the risk of disease transmission with unlimited availability of the material, which is a great advantage in cases of large areas for rehabilitation. According to research, they have a regenerative potential that includes the formation of fibrin, the release of growth factors derived from platelets and leukocytes, the formation of new blood vessels and cell proliferation, which has been shown to be beneficial for several types of rehabilitationtreatment9 . Despite the different classifications of platelet concentrates, the preparation protocol, kits, centrifuges, biological content of the concentrate, density and morphology of the fibrin network differ. Choukroun et al. defended in 2006 A-PRF (expanded platelet-rich fibrin) and I-PRF (liquid phase fibrin). That same year, Dohan et al. created L-PRF (autologous leukoplastic fibrin)14.

In the present study, A-PRF (platelet-enriched enhanced fibrin) was used to obtain the addition of platelets, widely cited in the literature for its availability, acceptable cost, ease of processing, ability to obtain unlimited amounts of material for patients with large areas to repair and its regenerative potential.

PRF is a bioactive material with obvious regenerative benefits that avoids the need to take grafts from a donor area on the palate, thus reducing postoperative morbidity. The biological activity of the fibrin molecule alone is sufficient to explain the healing capacity of PRF. Resulting in a favorable therapeutic alternative in the dental area. Although the clinical use of PRF has promising results in the treatment of gingival recessions, few studies have sought histological results15,16.

Given these advantages, which go against the limitations of autogenous gingival grafting, the objective of this study was to compare the clinical results of the use of a free gingival graft (FGraft), considered the gold standard, with the use of a PRF membrane to increase the band of keratinized mucosa in the area of rehabilitation of the teeth and root cover.

In the case study, the main complaint was aesthetic due to the exposure of the roots of teeth 13, 14 and 15 and the difficulty of obtaining a graft of compatible size in the extensive exposed area. On this occasion, it was decided to use a platelet-rich fibrin membrane (PRF) using the tunneling technique to obtain gingival thickness and root cover for gingival reconstruction.

For the placement of the PRF membrane, the receiving bed was prepared as an enveloping flap by a technically trained specialist with sufficient knowledge and skills to ensure complete coverage of the denuded roots in the immediate postoperative period.

At 30 and 180 days postoperatively, the clinical examination showed a healthy appearance (color, texture and anatomy) with a growth of gingival tissue in thickness and about 2 mm in height of elements 13, 14 and 15, although coverage occurred partially. It is interesting to note that the percentage of complete recovery with the tunnel technique using an autogenous gingival graft varies from 41.7% to 66.7%17, which can be explained by morphological variations, that is, the width, height and volume of the recession surface to be recovered. In the clinical case presented above, multiple recessions were very extensive with reduced thickness, which probably resulted in a lack of vascularization of the exposed part of the PRF membrane and partial root cover.

A 1985 Miller study showed that complete coverage in Class I and II recessions ranged from 88 to 100% 18,19. Other authors 20,21,22 showed much less pronounced results. It has already been established that root coverage is achieved in part by the bridge (when the graft is fed from the lateral circulation), as well as by progressive insertion (crawling attachment), when there is a postoperative migration of marginal tissue to the coronary tissue, which advances on the denuded root. These phenomena are known to be variable and therefore unpredictable when using an autogenous gingival graft. When extrapolated to the PRF, due to the shorter time of use and research, the control of these phenomena is not yet fully elucidated, since more histological and molecular studies are needed to clarify these aspects, which directly influence the success of grafts of different origins.

The approach of the clinical case presented has been to highlight the caution that must be taken with respect to the "gold standard" of autogenous gingival grafts when planning treatment, taking into account relevant aspects ranging from the clinical and systemic status of the patient, the indications, the execution technique, the training of the operator and the deep knowledge (clinical, histological and molecular) of the biomaterial to be used. These aspects will directly determine the predictability of the biomaterial and, therefore, the success of the treatment23,24,25.

5. Conclusion

According to the clinical results presented here, we can observe that the use of Platelet-Rich Fibrin (PRF) in Periodontics can mean an increase in root coverage in cases of multiple gingival recession, even if it is discreetly. Its use may bring considerable advantages as a possible substitute for the "reference" autogenous gingival graft, but more

histological and molecular studies are needed to ensure its use in clinical practice with greater safety and predictability.

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