IS LEUKOCYTE- AND PLATELET-RICH FIBRIN MEMBRANE AN ALTERNATIVE FOR THE TREATMENT OF MULTIPLE ADJACENT GINGIVAL RECESSIONS: A CASE SERIES AND REVIEW OF THE LITERATURE

LÖKOSİT VE TROMBOSİTTEN ZENGİN FİBRİN ÇOKLU KOMŞU DİŞETİ ÇEKİLMELERİNİN TEDAVİSİNDE BİR ALTERNATİF Mİ: BİR OLGU SERİSİ VE LİTERATÜR DERLEMESİ

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ÖZET

Çoklu dişeti çekilmeleri, ilişkili kozmetik veya patolojik sorunların yanı sıra tedavi sonuçlarının öngörülebilirliği açısından da klinisyenler için zorlu durumlardır. Bu anlamda pek çok cerrahi teknik ve materyal önerilmiş olsa da, hangi yaklaşımın ne oranda öngörülebilir başarı sağladığı tam olarak açıklığa kavuşturulmamıştır. Önerilen teknikler arasında tek başına veya koronale pozisyone flep ile kombine subepitelyal bağ doku grefti tam kök yüzey örtülemesi açısından daha başarılı bulunsa da, donör dokunun sınırlı olması, ikinci cerrahi saha gerekliliği ve ilgili postoperatif rahatsızlıktan ötürü daha az invaziv ve kolay tekniklere yönelik araştırmalar devam etmiştir. Bu çalışmalarda yer alan trombosit konsantratlarının kullanımı, yakın dönem klinik ve histolojik veriler ile desteklenmiş, yumuşak doku iyileşmesini geliştirmeye yönelik bir yaklaşımdır. Lökosit ve trombositten zengin fibrin (L-PRF), hazırlama basitliği, uygulama kolaylığı ve tamamen otojenik yapısı ile oral ve periodontal cerrahide kullanılan trombosit konsantratları içinde öne çıkmaktadır. Bu çalışmanın amacı, çoklu dişeti çekilmelerinin tedavisi ile ilgili literatürü gözden geçirmek ve Miller sınıf 1&2 bilateral çoklu dişeti çekilmelerinin tedavisinde koronale pozisyone flep ile kombine uygulanan subepitelyal bağ doku grefti ve L-PRF yaklaşımlarının erken dönem klinik başarı açısından karşılaştırıldığı bir olgu serisini sunmaktı.

Anahtar Kelimeler: Çoklu dişeti çekilmesi, bağ doku grefti, lökosit ve trombositten zengin fibrin.

SUMMARY

Multiple adjacent gingival recessions (MAGR) are challenging for clinicians in respect to cosmetic and pathologic problems and predictability of treatment results as well. Although several surgical techniques and materials have been proposed, the question of 'which approach promises predictable clinical success' has not been clarified. Among proposed techniques, subepithelial connective tissue graft (SECTG) alone or in combination with coronally advanced flap (CAF) has demonstrated better results for complete root coverage but due to donor tissue limitation, requirement of a second surgical site and related postoperative discomfort, research for less invasive and easy techniques has proceeded. As a topic of these studies, use of platelet concentrations targets enhanced wound healing in soft tissues as supported by recent clinical and histological data. Leukocyte- and platelet-rich fibrin (L-PRF) steps ahead among platelet concentrations used in oral and periodontal surgeries due to the features of easy preparation, simple application and utterly autogenic structure. The aim of this paper was to revise the literature regarding the treatment of MAGR and to present a case series consisting an early-term clinical comparison of SECTG versus L-PRF, both combined with CAF, performed for the treatment of bilateral Miller Class 1&2 MAGR.

Key words: Multiple gingival recession, connective tissue graft, leukocyte- and platelet-rich fibrin.

INTRODUCTION

Gingival recession (GR) is defined as the exposure of the root surface due to the displacement of the gingival margin apical to the cementoenamel junction (CEJ).[1] Anatomic factors such as a thin gingival biotype, prominent or proclined teeth could lead to GR, where

improper oral hygiene, calculus accumulation or piercings were also associated.[2, 3, 4, 5] GR is clinically detectable in a large population consisting young or elderly adults regardless of age and at single or multiple sites.[3, 5]

As a on-going matter of discussion, there is insufficient scientific evidence regarding the need of a minimum width of attached gingiva to maintain periodontal health and attachment level.[6] However, at sites with high frenum and extensive lack of attached gingiva, meticulous oral hygiene measures might not be achieved and rough surfaces of exposed cementum or dentine might harbour plaque accumulation and subsequent gingival inflammation might lead to clinical attachment loss. In case of GR, main indications for treatment are listed as hypersensitive root surfaces, difficulties in ensuring optimal mechanical plaque control and aesthetic concerns.[6, 7] A considerable amount of data demonstrated that various surgical techniques could lead to complete root coverage (RC) in single Miller Class I and II recessions but, multiple adjacent gingival recessions (MAGR) still challenges the clinician as larger avascular surface, poorer blood supply, varying recession depth and malposition of teeth jeopardizes wound healing.[8, 6] Various surgical techniques and materials have been utilised but none of them were validated for predictable coverage in MAGR but, scientific evidence and clinical opinions up-to-date refers to coronally advanced flap (CAF) and modifications of this technique solely or in conjunction with connective tissue graft (SECTG) may lead to high predictability and improved long-term stability.[6] Also, several materials such as fibrin glue, tetracycline root conditioners, enamel matrix derivatives (EMD), platelet-rich plasma and autologous platelet-rich fibrin (PRF) clot were proposed to improve clinical outcomes.[9, 6]

Choukroun's PRF (leukocyte- and platelet-rich fibrin, L-PRF) is an autologous, non-thrombinized, dense and stable fibrin matrix rich in platelets and leukocytes. Over an extended period of time, a properly prepared L-PRF membrane releases several cytokines and growth factors related to immune-inflammatory response and complex cascade of wound healing. [9, 10] Considered as a living biomaterial with a simplified preparation and handling protocol, L-PRF is commonly used in dental implant and periodontal plastic surgeries, solely or in combination with some other types of biomaterials, to enhance soft and hard tissue healing. [9, 11, 12]

The use of PRF for the treatment of MAGR has also been investigated but not compared with the usage of other biomaterials or autogenous soft tissue grafts.[6] The objective of this case series was to present 6-months follow-up of 3 cases of bilateral MAGR, treated with CAF in combination with either SECTG or L-PRF, and to revise the scientific evidence for the treatment of MAGR.

CASES

Case Selection Criteria

Patients meeting following criteria were informed about predictable treatment options in detail:

- At least two sites of Miller Class I or II MAGR involving ≥2 teeth
- ASA I, without history of or current smoking, Age ≥18
- No addiction to drugs and/or current anticoagulant treatment
- Presence of identifiable cemento-enamel junction (CEJ)
- Presence of a minimal amount of keratinized tissue apical to the defects
- Marginal flap thickness ≥1mm
- Full-mouth plaque index <10% with meticulous oral hygiene measures
- No sign of acute and/or inflammatory periodontal disease
- No history of previous surgical attempt to correct the GR
- Signed consent and willingness to be coherent to the instructions

Three cases, opting for simultaneous use of either L-PRF or CTG, both combined with CAF, were presented. Oral and written consent were received. Initial periodontal therapy consisting full-mouth scaling and prophylaxis was scheduled one-month before the surgeries.

Clinical Recordings

All measurements were made at baseline, and 1, 3 and 6 months postoperatively by the same examiner (GT) with a calibrated periodontal probe. At the mid-buccal point of the teeth involved, recordings were GR as the distance from CEJ to the gingival margin (GM), clinical attachment level (CAL) as the distance from CEJ to gingival sulcus bottom and probing depth (PD) as the distance from GM

Table 1. *Mean clinical measurements (mm) and PRC of surgical sites at the baseline and 6th month.*

		CASE 1		CASE 2		CASE 3	
	SURGICAL PROCEDURE	***CAF& SECTG***	***CAF& L-PRF***	***CAF& SECTG***	***CAF& L-PRF***	***CAF& SECTG***	***CAF& L-PRF***
PRE-OPERATIVE (BASELINE)	**GR** (total) (mm)	16	17	12	15	22	27
	GR (mean) (mm)	4,125		3,37		3,5	
	CAL (mean) (mm)	1,85	2,25	2,41	2,3	2,4	2,9
	PD (mean) (mm)	1,05	1,5	1,91	1,7	1,7	2
POST-OPERATIVE (6TH MONTH)	**GR** (total) (mm)	7	9	4	6	6	15,5
	GR (mean) (mm)	2		1,25		1,53	
	CAL (mean) (mm)	1,38	1,7	2,25	2,2	2	2,4
	PD (mean) (mm)	0,88	1,3	2,08	1,95	1,8	1,8
	PRC (mean) (%)	56	47	67	60	72	45

to the bottom of the gingival sulcus. The percentage of root coverage (PRC) was calculated as the ratio of the difference between preoperative GR and postoperative GR to the preoperative GR. Baseline and final recordings are given in Table 1. Adverse effects such as patient discomfort, tooth hypersensitivity and esthetic concern were evaluated at every postoperative recall session.

L-PRF Preparation

Prior to surgery, intravenous blood was drawn to six 10-ml vials without anticoagulant and centrifuged immediately at 2,700 rpm for 12 minutes in a specific centrifuge (Figure 1). The fibrin clot formed in the middle of the tube as the upper part contained an acellular plasma and bottom part contained the red corpuscles (Figure 2). The clots were transferred from the tubes to a special box-compressor where constant and thick membranes of L-PRF were obtained and preserved (Figure 3).

Surgical Procedure

After local anaesthesia, both surgical operations (CAF&L-PRF or CAF&SECTG) were performed during same session but in separate for maxillary and mandibular defects. Recession defects were meticulously scaled using appropriate curettes. Root conditioning was not performed.

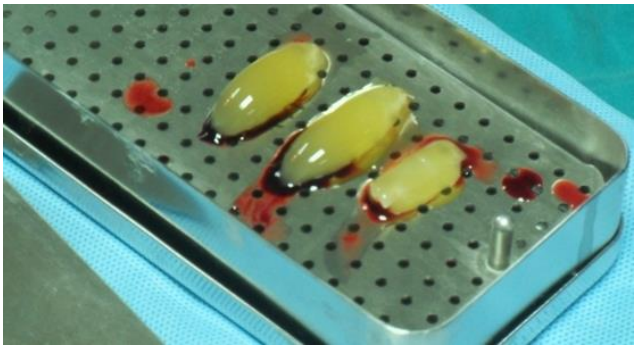
Flap design for CAF&L-PRF procedure consisted an intrasulcular incision initiated at the vestibular aspect of the involved teeth and extended horizontally at the CEJ level, one-tooth mesial and distal to the defects.

Figure 1. *Process PC-02© centrifuge (Process, Nice, France).*

Figure 2. *The fibrin clot.*

Releasing incisions were beyond the mucogingival junction (MGJ) in an apically divergent manner. A split-thickness flap was reflected and extended for tension-

Figure 3. *PRF-Box© (Process, Nice, France).*



free advancement to the CEJ. The vestibular epithelium of the interdental papillae was removed to provide a proper wound bed for healing. L-PRF membranes with a minimum of 2 layers in opposite directions were placed over the recipient area and care was taken to hang them over the gingival margin for 1-2 mm. The flap was sutured with minimal tension at the level or slightly coronal to the CEJ.

Flap design for CAF&SECTG procedure consisted preparation of the recipient site by eliminating the sulcular epithelium at first with an internal beveled incision, followed by an envelope preparation apically and laterally by split incisions beyond MGJ. SECTG was harvested from the palate using a trap door approach and inserted into the recipient area to cover the exposed root surfaces and adjacent recipient bed. Donor site was subsequently sutured. Graft was not penetrated but secured to palatal aspect of the teeth with an x shaped sling suture, anchoring the periosteum apical to the graft. The flap was sutured with minimal tension at the level or slightly coronal to the CEJ.

Postoperative Protocol

Analgesics (acetaminophen, 750mg, 3*1) for 3 days and chlorhexidine gluconate (0.12%) rinse for 2 weeks were prescribed. Brushing and flossing on operated sites were ceased until suture removal (14 days). A soft diet was advised for a week. All cases were enrolled in a periodontal maintenance schedule, weekly for first 4 weeks and then monthly until the end of the follow-up period.

CASE 1

A 50-year-old, male, ASA I patient with a chief complaint of generalized hypersensitivity reported to the department. The patient was referred for the treatment

Figure 4. *Case 1, preoperative, CAF&SECTG site.*

Figure 5. *Case 1, preoperative, CAF&L-PRF site.*

Figure 6. *Case 1, postoperative, CAF&SECTG site, 3rd month.*

Figure 7. *Case 1, postoperative, CAF&L-PRF site, 3rd month.*

of MAGR. Clinical and radiographic examination revealed bilateral Miller Class I&II MAGR on the buccal aspect of teeth (FDI) 15, 14, 13, 21, 22, 23, 24, 25, 35, 34, 33, 44 and 45 (Figure 4, 5). Maxillary right quadrant was treated with CAF&SECTG technique while CAF&L-PRF technique was performed on maxillary left quadrant (Figure 6, 7).

Postoperative (secondary) bleeding and delayed wound healing was observed on the donor site. Considering PRC at 6th month, it was 56% for the CAF&SECTG site and 47% for the CAF&L-PRF site. Due to postoperative discomfort

regarding SECTG procedure, treatment for the MAGR in mandibular regions were not performed.

CASE 2

A 49-year-old, male, ASA I patient referred to the department for the treatment of MAGR related to traumatic tooth brushing. Clinical and radiographic evaluation revealed Miller Class I&II MAGR on the buccal aspect of teeth (FDI) 16, 15, 14, 24, 25, 35, 34 and 44 measuring 3,37mm as mean GR (Figure 8). Maxillary and mandibular right quadrants were treated with CAF&SECTG technique while CAF&L-PRF technique was performed on left quadrants symmetrically (Figure 9). There was not any complication observed on the donor or recipient site of SECTG. On the other hand, rapid wound healing and almost complete RC were detectable for L-PRF at early post-operative phases but without long-term stability (Figure 10, 11). Considering PRC at 6th month, it was 67 %for CAF&SECTG site and 60% for CAF&L-PRF site (Figure 12). The patient did not report any aesthetic concern or increased hypersensitivity.

Figure 8. *Case 2, preoperative.*

Figure 9. *Case 2, perioperative, CAF&L-PRF site.*

Figure 10. *Case 2, postoperative, CAF&L-PRF site, 10th day.*

Figure 11. *Case 2, postoperative, CAF&L-PRF site, 1st month.*

Figure 12. *Case 2, postoperative, CAF&L-PRF site, 6th month.*

CASE 3

A 49-year-old, male, ASA I patient with bilateral MAGR on both arches was referred to the department for treatment. Clinical and radiographic evaluation revealed Miller Class I&II MAGR on the buccal aspect of teeth (FDI) 15, 14, 13, 12, 11, 21, 22, 23, 24, 25, 35, 34, 43 and 44 measuring 3,5mm as mean GR (Figure 13, 14). Maxillary and mandibular right quadrants were treated with CAF&SECTG technique while CAF&L-PRF technique was performed on left quadrants symmetrically. Regarding SECTG, secondary bleeding, pain and delayed wound healing was observed on the donor site. Regarding L-PRF, there was not any postoperative complication recorded.

Figure 13. *Case 3, preoperative, CAF&SECTG site.*

Figure 14. *Case 3, preoperative, CAF&L-PRF site.*

Considering PRC at 6th month, it was 72% for CAF&SECTG site and 45% for CAF&L-PRF site (Figure 15, 16).

Figure 15. *Case 3, postoperative, CAF&SECTG site, 6th month.*

Figure 16. *Case 3, postoperative, CAF&L-PRF site, 6th month.*

DISCUSSION

Management of MAGR is challenging and the choice of treatment may be based on several factors such as anatomic structure, anticipation of postoperative discomfort, possible need for more than one surgical procedure to treat the entire recession site and the cost.[13, 14] Studies focusing on the treatment of MAGR have proposed different techniques such as SECTG, CAF, guided tissue regeneration (GTR) and modifications alone or in combination with orthodontic button application or with a variety of biomaterials including matrix grafts, root conditioners, EMD or platelet concentrates in order to satisfy aesthetic demands, cover exposed root surfaces, improve CAL and reduce GR.[8, 15, 16] A cross-sectional survey among dentists and periodontists revealed that the pre-dominant indication for RC was esthetics, and most favoured treatment options were free gingival grafting, SECTG, CAF and GTR consecutively.[17] The aim of this paper was to revise the literature on the treatment of MAGR and to present a case series to clinically compare the SECTG versus L-PRF, both combined with CAF, utilised for the treatment of Miller Class I&II MAGR.

The primary outcome variable in clinical studies on GR is complete RC as a percentage, where changes in mean and total RC in milimeters should also be evaluated in cases of MAGR.[18] Data of our cases are limited to CAL, PD, mean and total GR as we were principally interested in the outcome of RC. Parameters related to postoperative comfort were also recorded but not based on a survey, which would be appropriate for a case-control study. Also, a randomized case-control study aimed to find out whether the tested surgical approach makes the treated sites less susceptible to future recession, should evaluate the changes in keratinized tissue dimensions in milimeters.[18, 19] As MAGR include ≥2 teeth, width of each GR should be considered in such studies to verdict on the predictability of the tested technique in various clinical conditions. Additionally, survey on cosmetic evaluation of the treatment outcome should be carried out with an approved system such as 'root coverage aesthetic score (RES)', especially in studies with a follow-up period ≥1 year.[20-22]

Most of the available data regarding MAGR with Miller Class I and/or II treatment are case series with one single surgical technique and very few studies refer to the comparison of various techniques.[18] A recent systematic review revealed that CAF and modified CAF (mCAF) yielded predictable RC and the results obtained by mCAF were maintained up to 5 years for MAGR cases.[6] Also, several clinical studies proclaimed that the use of SECTG solely or in conjunction with CAF, mCAF, coronally positioned pedicle, double pedicle graft or the supraperiosteal tunnel technique promised better and more stable results than with barrier membranes, acellular dermal matrix (ADM) or platelet concentrates.[9, 23-26, 6, 27, 28] The use of CAF&SECTG has also been suggested to gain increase in gingival/mucosal height and thickness in addition to RC and treat MAGR in sites with aesthetic concern, limited vestibule depth or deep cervical abrasions.[13, 19, 29-31] Pini-Prato et al.[32] Confirmed the superiority of CAF&SECTG over CAF alone for the treatment of Miller I&II MAGR in their split-mouth study with 5-year follow-up. Carvalho et al.[13] demostrated that mCAF&SECTG was effective and predictable to gain in RC, CAL and in the width of keratinized tissue at Class I or II MAGR. Chambrone and Chambrone[14] documented 96% mean RC for six months with CAF&SECTG in 28 patients and referred the procedure to be significantly effective especially in defects localised in maxillary arch. Chambrone et al.[33] Published meta-analysis recently and referred the use of SECTG with the best predictability in

achieving complete RC as they also stated that CAF&SECTG with or without soft tissue grafts or biomaterials revealed better outcomes. Collectively, we considered CAF&SECTG as the 'control procedure' to test CAF&L-PRF for the cases with Miller I&II MAGR.

Relying on the knowledge that a careful assessment of aesthetic expectance of the patient, existing anatomic/surgical parameters such as the amount of keratinized tissue, the periodontal biotype, flap thickness, papilla height, root convexity and vestibule depth consists the vital parts of the surgical decision process and each case must be individually evaluated and informed in detail to determine the most predictable and the least invasive surgical approach.[18, 34, 16] From this point of view, a different alternative than SECTG might be opted in order to avoid the limitations of SECTG technique such as the need for a second surgery for tissue harvesting, anatomic limitations of donor site/tissue, infection and/or sloughing at the receptor site, postoperative discomfort and a final tissue contour with bulky appearance which could require a second surgery for enhancing the aesthetics.[35, 36] Although SECTG is considered as the gold standard for the treatment of single or multiple GR, a simple and non-invasive approach such as CAF might also yield an equally acceptable result if gaining tissue thickness is not the primary objective.[37] Zucchelli et al. opted for CAF to treat MAGR, regardless of the surgical technique, to achieve RC and to avoid perioperative risks, postoperative discomfort, unaesthetic graft exposure and delay in healing of the donor site due to the need for a larger graft. Pini Prato et al.[38] stated that both single and multiple GRs treated with either CAF or CAF&SECTG achieved similar RES scores after 1-year follow-up. Zucchelli and De Sanctis[39] tested a mCAF for the treatment of MAGR in the maxillary anterior region and reported that in patients with aesthetic demands, the technique were successful both in terms of RC and increase in keratinized tissue height. In addition to these efforts, the use of dermal allografts has also been advocated to be an alternative to SECTG.[37] Woodyard et al.[40] demonstrated the superiority of CAF&ADM to CAF alone in regard to increased gingival thickness and RC. Mahn[41] studied MAGR treatment in the aesthetic zone and suggested the use of ADMs for combination with tunnel technique instead SECTG in order to avoid donor tissue limitation and more invasive surgery. Schlee and Esposito[42] referred the human dermis graft as a predictable alternative to SECTG for enhancing gingival biotype and RC for MAGR.

Aimed to overcome the limitations of conventional techniques and modifications, including the healing primarily by means of long junctional epithelium with minimal connective tissue or bone formation, GTR-based RC was introduced by Pini Prato et al.[43] in 1992 and provided comparable results.[44-46] Several studies investigated the use of GTR-based RC with absorbable or non-absorbable membranes also with the adding of bone grafts to create and maintain the space needed of GTR, but very few addressed MAGR.[47, 48] Boltchi et al.[49] avoided the donor site surgery and utilised an absorbable barrier (polylactic acid) in combination with CAF to treat single or MAGR Miller Class I, II and III buccal defects and revealed high predictability and aesthetic results with the technique. A meta-analysis on GTR-based RC revealed that the related surgical techniques can be used successfully to repair GR defects but conventional mucogingival surgery resulted in statistically better RC and width of keratinized gingiva.[50] Remarkably, a recent review by Wang et al.[51] listed the benefits of GTR-based RC procedures include new attachment formation, elimination of donor site morbidity, less chair-time, and unlimited availability and uniform thickness of the biomaterial and remarked that collagen membranes, in particular, were advantageous due to high biocompatibility, ability to promote fibroblast chemotaxis, hemostasis and angiogenesis and gingival biotype. In addition, some studies also investigated whether EMD, known to enhance the soft tissue healing and promote cementogenesis, had a positive effect for GR treatment.[52, 53] In general, the results are conflicting and few of them refer to MAGR. A systematic review on EMD in reconstructive periodontal therapy concluded that the additional use of EMD with a CAF for GR treatment will give superior results compared with a control but is as effective as a SECTG.[54] On the contrary, Cordaro et al.[55] evaluated the additive effect of EMD on CAF for MAGR treatment and demonstrated high clinical success with CAF regardless of EMD for 24-month follow-up. Aroca et al.[23] reported that the addition of EMD does not enhance the mean clinical outcomes of modified

tunnel/SECTG technique for the treatment Class III MAGR.

The use of EMD sets an example for the most recent approaches for RC therapies, which incorporates growth factors (GF) into previously defined techniques to enhance healing response and possibly promote regeneration.[37] Various platelet concentrates such as plasma rich in growth factors (PRGF), platelet rich plasma (PRP) and PRF have also been studied to this purpose.[11] Due to several components and GFs residing in platelet concentrates, application of these products have been considered to enhance immune-inflammatory response, primary hemostasis, angiogenesis, mitogenesis of endothelial cells, osteoblastic proliferation and mineralization and stimulate the secretion of other GFs in situ.[37, 11] Although there is not sufficient evidence to support the use of PRP as an adjunct to RC therapies, a few studies claimed a relative benefit of a 'plasma concentrate' in combination with GTR-based RC, CAF and CTG for wound healing index values and gain in gingival thickness as they processed the product from PRP as an enhanced concentration of platelets.[56-60] Suadid et al.[61] demonstrated that the combination of PRP with SECTG was more effective in promoting new cementum formation than SECTG alone in their experimental study. A recent comparative clinic study by Lafzi et al.[62] stated that PRGF enhanced the outcomes of CAF in short-term but offered no clinical advantage over CAF subsequently. Anilkumar et al.[63] reported a 19-year-old male patient with single recession on the mandibular left incisor, successfully treated with PRF and laterally positioned flap combination. Jankovic et al.[64] evaluated the clinical effectiveness of CAF&PRF and compared it with CAF&EMD for Miller Class I or II single GR treatment, failing to demonstrate any clinical advantage of the use of PRF compared to EMD except postoperative comfort. Interestingly, in another study of Jankovic et al., it was reported that no difference was observed between PRF and CTG procedures in GR therapy, except for a greater gain in keratinized tissue width obtained in the CTG group and enhanced wound healing and postoperative comfort associated with the PRF group. Aleksic et al.[65] compared CAF&PRF and CAF&SECTG for treating Miller Class I or II single recessions and concluded that both procedures were effective with equivalence of clinical results for RC while the utilization of the PRF membrane led to a decreased postoperative discomfort and advanced tissue healing. Only one clinical study up-to-date evaluated PRF membrane for the treatment of MAGR, concluding that the addition of PRF positioned under mCAF enhanced the gingival biotype but not RC at 6 months.[9] To remark, the followed protocol to prepare the PRF membrane in related studies were not optimized and potentially influential factors such as PRF consistency, platelet concentration and PRF membrane positioning in relation to CEJ were not evaluated in detail.

Most products of platelet concentrates for surgical use are termed PRP but such incomplete terminology leads to many confusions in the scientific database.[66] Relying on leukocyte content and fibrin architecture as 2 key characteristics to define and classify the platelet concentrates, L-PRF is an optimized, natural blood clot without blood modifications maintaining physical stability and slow-release of various GFs related to soft&hard tissue healing (*i.e.* transforming growth factor ß1, platelet-derived growth factor-AB and vascular endothelial growth factor), matricellular glycoproteins related to coagulation (*i.e.* thrombospondin-1) or to cell migration (*i.e.* fibronectin and vitronectin) for ≥7 days. Additively, The presence of leukocytes has a great impact on the biology of L-PRF due to their immune and anti-infectious properties, and regulatory effects on wound healing process and local GF distribution.[10, 66] To obtain and use a L-PRF membrane as adjunct to surgical procedures, a standard protocol should be followed to optimize physical and biologic properties through immediate centrifuge following blood collection and utilization of a sterile box for preparation& preservation under standard pressure, temperature and humidity, avoiding dehydration.[67, 68] Another topic to consider is the technique of PRF application. To utilize an adequate matrix volume and core material homogenity, at least of PRF membranes should be placed in opposite directions due to the facts that these inhomogenous membranes are quickly resolved in an efficiently vascularized environment and long-term stability of the stimulated tissue requires a thick and strong fibrin-based cicatirical matrix, especially in cases with MAGR even with a thin biotype. To achieve maximum RC, PRF membranes should be considered as a living, interpositional biomaterial and be positioned over the recession defects

above CEJ in order to separate and stimulate the interface between gingival tissue and the root surface, to maintain the flap in a high and stable position, to enhance neoangiogenesis and reduce necrosis and flap shrinkage.[11, 67, 12]

In the cases presented, the above-mentioned protocol and technique were strictly followed to obtain and utilise L-PRF membranes.[67] Easy handling and utterly autogenic structure of L-PRF with immune-inflammatory features led to a rather practical surgery avoiding a second wound and a better post-operative course as reported by the patients and observed by the authors. In contrary to SECTG procedure, a limitation in regard to available biomaterial was not a concern as it was possible to obtain 16 PRF membranes with the special box-tool. On the other side, SECTG yielded better RC and revealed the question of comparing clinical success of CAF&SECTG versus CAF&SECTG&L-PRF.

The opinion of the authors in regard to a rapid healing phase, a decrease in postoperative discomfort, an enhanced coherence of the patient and a higher RC in early-term without long-term stability for L-PRF procedure is in accordance with previous reports.[65, 64] On the other hand, SECTG surgery caused relevantly higher postoperative discomfort as these complications were considered to be due to donor site anatomy, large defect areas and insufficiency of donor tissue in dimensions. Large-sized grafts jeopardize the quality of vascular exchange between the mucoperiosteal graft and the recipient site, thus, may lead to flap dehiscence and unaesthetic exposure of the graft material. Very few data refers to the effectiveness of SCTG in MAGR treatment as this treatment option has been limited due to afore-mentioned shortcomings, for patients with esthetic complaints in particular.[13, 14, 69] As Zucchelli et al.[70] demonstrated, use of a CAF, an envelope type in particular, without SECTG could lead to reduced GR, complete RC and a better postoperative course. Collectively, technical issues and adjuvant biomaterials are still under research but avoiding vertical incisions, doing tunnel technique especially in the esthetic zone and using platelet concentrates are encouraged. To remark, some studies have also underlined the potential benefit of utilizing a surgical microscope for GR therapy.[71]

CONCLUSION

As a principle, clinical application and evaluation of biologic adjuvants for surgical procedures requires a strong fundamental knowledge and a well-adapted methodology. Platelet derived products offer serious advantages in regard to immunologic properties and in-surgery ergonomics, but clinical studies aimed to evaluate the long-term effect of these products with defined or recently developed techniques are scarce. The use of L-PRF, as a promising biomaterial, should be comparatively evaluated from this perspective for the treatment of recession defects, MAGR in particular.

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