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Leukocytic Platelet Rich Fibrin (L-PRF) Versus Subepithelial Connective Tissue Graft (SCTG) Using Tunneling Technique in Treatment of Gingival Recession (Randomized Controlled Clinical Study)

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ORIGINAL ARTICLE / *ARTICLE ORIGINAL*

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LEUKOCYTIC PLATELET RICH FIBRIN (L-PRF) VERSUS SUBEPITHELIAL CONNECTIVE TISSUE GRAFT (SCTG) USING TUNNELING TECHNIQUE IN TREATMENT OF GINGIVAL RECESSION: RANDOMIZE CONTROLLED CLINICAL STUDY

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Introduction: Gingival recession is a problem encountered daily in clinical practice, its etiology is often a multifactorial one. Surgical treatment is the only method to reverse this condition. Objective: to evaluate the effectiveness of leukocytic platelet rich fibrins (L-PRF) versus subepithelial connective tissue graft (SCTG) in the management of recession defects Miller's class I or II (RT1) using the tunnel technique (TUN).

Methods: 20 systemically healthy patients were allocated randomly to TUN with L-PRF (group A), and TUN with SCTG (group B). Probing depth, clinical attachment level, recession depth, width of keratinized tissue, gingival thickness, and recession esthetic score and wound healing index are clinical variables measured at baseline,14 days, 3 months, and 6 months postoperatively.

Results: Significant improvement in mean CAL, and RD for both groups, and significant difference in GT and WKT for group B as well as higher RES. A significant difference was also recorded in group A for WHI

Conclusions: Both grafting modalities in combination with tunnel technique improved gingival phenotype switching. Although SCTG gives higher esthetic and functional results including better color matching, tissue contour and increased width of keratinized tissue, L-PRF has superior healing properties and can be used as an alternative to treat multiple gingival recession defects where the need of second surgical site is eliminated.

Keywords: Connective tissue graft, gingival recession, leukocytic platelet rich fibrin, subepithelial connective tissue graft, pouch and tunnel.

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Conflicts of interest:
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FIBRINE RICHE EN PLAQUETTES LEUCOCYTAIRES (L-PRF) VERSUS GREFFE DE TISSU CONJONCTIF SOUS-ÉPITHÉLIAL (SCTG) UTILISANT LA TECHNIQUE DE TUNNELLISATION DANS LE TRAITEMENT DE LA RÉCESSION GINGIVALE : UNE ÉTUDE CLINIQUE CONTRÔLÉE RANDOMISÉE.

Introduction: La récession gingivale est un problème rencontré quotidiennement en pratique clinique, son étiologie est souvent multifactorielle. Le traitement chirurgical est la seule méthode pour inverser cette condition. **Objectif**: évaluer l'efficacité des fibrines riches en plaquettes leucocytaires (L-PRF) par rapport à la greffe de tissu conjonctif sous-épithélial (SCTG) dans la prise en charge des défauts de récession de classe I ou II de Miller (RT1) en utilisant la technique du tunnel (TUN).

Méthodes :20 patients systémiquement sains ont été répartis au hasard entre TUN avec L-PRF (groupe A) et TUN avec SCTG (groupe B). La profondeur de sondage, le niveau d'attache clinique, la profondeur de la récession, la largeur du tissu kératinisé, l'épaisseur gingivale, le score esthétique de la récession et l'indice de cicatrisation sont des variables cliniques mesurées au départ, 14 jours, 3 mois et 6 mois après l'opération.

Résultats : amélioration significative de la moyenne CAL et RD pour les deux groupes, et différence significative de GT et WKT pour le groupe B ainsi qu'un RES plus élevé. Une différence significative a également été enregistrée dans le groupe A pour WHI. **Conclusions** : Les deux modalités de greffe en combinaison avec la technique du tunnel ont amélioré le changement de phénotype gingival. Bien que le SCTG donne des résultats esthétiques et fonctionnels plus élevés, notamment une meilleure correspondance des couleurs, un meilleur contour des tissus et une largeur accrue des tissus kératinisés, le L-PRF a des propriétés de cicatrisation supérieures et peut être utilisé comme alternative pour traiter plusieurs défauts de récession gingivale où le besoin d'un deuxième site chirurgical est nécessaire éliminé.

Mots clés : Greffe de tissu conjonctif, récession gingivale, fibrine riche en plaquettes leucocytaires, greffe de tissu conjonctif sous-épithélial, poche et tunnel.

Introduction

Gingival recession is defined as root surface exposure to the oral cavity because of the apical migration of the gingival tissues of one or more teeth. The recession of the gingiva, either localized or generalized can lead to clinical problems such as root surface hypersensitivity, root caries, cervical abrasion, difficult plaque control and diminished cosmetic appeal [1].

With increasing esthetic demands these surgical procedures are modified to preserve and enhance esthetics by various periodontal plastic surgical procedures such as coronally advanced flaps, lateral advanced flaps, coronally modified flaps with sub epithelial connective tissue grafts. These surgeries deal with procedures that are designed to enhance esthetics, restore form, function and also include regenerative modalities [2, 3].

Pouch and tunnel technique is indicated to treat Miller's class I and class II gingival recession depth (RT1 of Cairo classification) [4], lack of adequate donor tissue for lateral sliding flap, presence of multiple and wide recessions in maxillary teeth, increased recession in areas where esthetic concerns is of a great one and exposed root sensitivity [3].

The pouch and tunnel technique is viewed as one of the most recent treatment approaches for gingival recession could be combined with the advantages of subepithelial connective tissue grafting as well as the envelope technique and therefore it makes an ideal choice for treating multiple recessions in a single surgical procedure demonstrating early healing, high predictability for root coverage and less patient's discomfort [5].

The technique used, if performed correctly, is considered the most predictable periodontal plastic surgery procedure. A highly sensitive procedure and requires use of operating microscope, microsurgical instruments, delicate handling of the tissues and ample patience while undermining the interdental papilla. The preparation for the surgery is as important as its performance to avoid any possible complication as much as we can [2].

The common complications that can occur are: detachment of the inter-dental papilla, thinning of the flap, too thick connective tissue graft harvested which can lead to ischemic necrosis of the inter dental papilla and too thin connective tissue graft harvested which can lead to insufficient coverage of the recession defect [5].

Subepithelial connective tissue graft is considered to be the gold standard. The use of SCTG for the resolution of the recessions and the increasing of the keratinized gingiva strip, it is based on its excellent bio-mimetic capacity, highlighting the induction potential of two fundamental characteristics: the keratinization of the gingival mucosa and a new adhesion of periodontal connective tissue [6]. Nevertheless, patient morbidity, the need for a second surgical site, and its limited availability are the main drawbacks that have been largely described for SCTG, and thus the main cause that made researches thrive to another large variety of substitutes including acellular dermal matrix, xenogeneic collagen matrix, and platelet rich fibrins [7].

Platelet rich fibrins (PRF) as a platelet concentrates, can be used as a successful alternative for soft tissue graft keeping the patient comfortable and painless at the time of surgery as it does not require two surgical sites [8]. It would be considered as an autologous cicatricial matrix and is just not a biological additive but rather could be considered as a cell-based therapeutic approach. Being a highly elastic, strong, and flexible mesh with inherent equilateral three-dimensional architecture, PRF results in slower, sustained release of growth factors and cytokines [9]. It is considered as a healing biomaterial, with its homogenous fibrin network it is used for enhancing healing of the soft tissue in periodontal plastic surgical procedures and implants, in the treatment of intra-bony defects and bone regeneration [10, 11].

The treatment with platelet concentrates increases the keratinized gingival width due to the release of growth factors which helps in the stimulation and proliferation of gingival and periodontal fibroblasts [12].

In conclusion, a study made in Beijing 2019, Tunneling technique combined with subepithelial connective tissue graft is an effective treatment for localized gingival recession. Although clinical outcomes indicated decrease in recession depth and width, and increase in width of keratinized tissue, but patients suffered little pain during the operation and 2 weeks post-operation of healing and accessed good aesthetic satisfaction, and this strengthens the theory proposing that the using the same technique along with PRF could give better results with less patient's discomfort because of the elimination of second surgical site forming a more modern and minimally invasive vision for treating of one of the most common periodontal problems as mentioned previously [13].

Consequently, due to limited studies comparing the effect of combining leukocytic platelet rich fibrin with tunnel and pouch technique versus subepithelial connective tissue graft. This study was conducted based on the null hypothesis to evaluate whether this approach could improve functional and esthetic outcomes.

Materials and Methods

This study was carried out as a randomized controlled clinical trial parallel arm with allocation ratio 1:1. 20 patients were assigned using two arm parallel group. All procedures were explained to the patients with confidentiality. A written informed consent is obtained for each patient included in the study. The study was submitted to the Institutional Review Board (IRB) of BAU for ethical approval. IRB number: 2023-H-00116-D-M-0509.

The range of age included was from 20- 50 years of both genders, with gingival recession defects of Rt1 according to Cairo classification. Thick gingival phenotype was also included, and teeth involved were vital and did not undergo any periodontal treatment in the previous 24 months with absence of irregularities, caries or defective restorations on the sites to be treated. Full mouth plaque score <20% and full gingival bleeding index < 20%. On the other hand, medically compromised patients, pregnant women, patients under treatment with drugs that might cause gingival enlargement and smokers of more than 10 cigarettes per day were excluded. Teeth with endo-perio lesions were excluded and sites were free from periodontal defects or periodontitis. Thus, 20 selected patients with multiple gingival recession RT1 were randomly divided using computer random allocation program into two groups as following: Group A: 10 patients, tunneling technique with L-PRF; (Test group) and Group B: 10 patients, tunneling technique with SCTG; (Control group).

Consort Flow Diagram

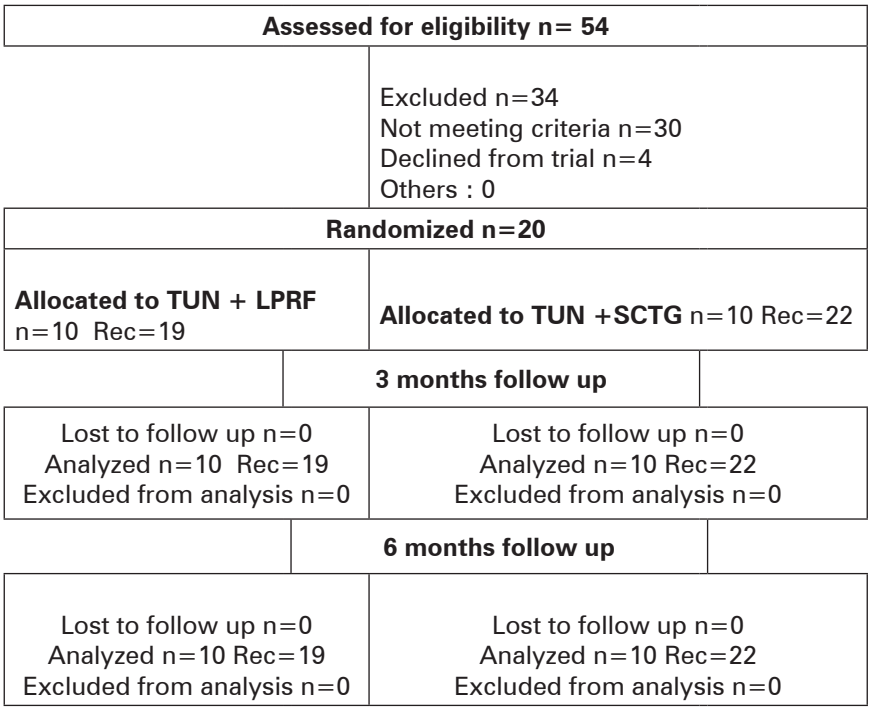

Figure 1: Consort Flow Diagram. Group A: TUN+ LPRF and Group B: TUN+SCTG

Presurgical Phase Therapy

Patients were primary evaluated through history taking, extraoral and intraoral evaluation, clinical evaluation of the recession site including periodontal charting, periodontal risk assessment were conducted for all patients of the two groups. Phase I therapy (initial periodontal treatment) was imposed including oral hygiene instructions along with patient's motivation and education, professional mechanical plaque removal both supragingival and subgingival and minor occlusal adjustments done in cases that showed clinical and/or radiographic signs of trauma from occlusion.

Evaluation of gingival recession

Assessing the recession was done using the following clinical parameters at baseline, 3 months, and 6 months post-surgically. Clinical evaluation of the following clinical parameters:

Full mouth plaque score (FMPS) according to O'Leary defined as full mouth plaque score (FMPS) was recorded as the percentage of tooth surfaces that revealed the presence of plaque detected by the use of a periodontal probe, modified from the crevice ,Gingival bleeding index (GBI) according to Ainamo & Bay ; it's based-on recordings from all four surfaces of all teeth determined by gentle probing of crevice using UNC periodontal probe and recording the results, it is calculated as a % of affected sites.

Probing depth (PD) is measured as the distance from the free gingival margin (the middle of the margin) to the base of the pocket. Clinical attachment level (CAL): it is the distance measured from the cemento-enamel junction to the bottom of the sulcus. Width of keratinized tissue (WKT): this parameter is defined as the distance from the free gingival margin to the mucogingival junction. The Recession depth (RD) which is measured clinically as the distance from the CEJ to the depth

of the free gingival margin using the millimeter markings on the periodontal probe and reflects exposure of the root cementum.

Gingival tissue thickness (GT) was assessed mid-buccally halfway between the MGJ and the free gingival groove in the attached gingiva using an endodontic spreader fitted with a rubber stopper and measured on the ruler. And the Recession esthetic score (RES) is established to assess the coverage achieved according to five variables and the score is added to have the final number. The score value ranges from 0 to 10. A score of 10 indicates maximum root coverage with excellent outcome.

Surgical Therapy

Tunneling Technique

At the affected quadrant, an antiseptic iodine swab was applied extra and intraorally. A 4% anesthesia with adrenaline (1:100,000) was infiltrated locally. The incision started with blade15c and then a mixed (full and partial) mucoperiosteal flap was reflected extending beyond the mucogingival junction, but care was taken not to extend it till the tip of the interdental papilla using the selected tunneling instrument (curved or straight) according to the surgical site and handling of the surgeon.

Each papilla adjacent to the recession was undermined gently, without detaching it completely to prepare a tunnel. The undermining of tissues to prepare the tunnel was done by extending it laterally by about 3-5 mm.

Note that when tissues are passively colonized and decompressed without any stress in the CEJ, the degree of coronal movement is sufficient, and this allows for more coronal traction of the tunnel with a sling suture.

Continuous irrigation with saline was ensured to prevent any clotting of blood inside the tunnel created and the tissues were handled with extra care not to tear any of the margins or extend the reflection to the interdental area. After securing the flap, the site will be prepared to receive SCTG or PRF membrane that is trimmed to fit the dimensions of the surgical area and adjusted overlying the root surfaces. The site was readapted to its new level and fixed by 4.0 vicryl/ 5.0 monofilament polypropylene sutures were used for the recipient site and the palate (in case of SCTG) was sutured with 3.0 silk non resorbable sutures.

Graft Preparation

Group A: L-PRF

PRF was introduced as the first totally autologous concept without additional anticoagulants. Not needing an anticoagulant significantly reduces the risk of trans-contamination. It also allows the physiologic cell functions to continue after the centrifugation process. Based on Choukroun's protocol for PRF preparation [14] the following protocol is followed: 10 ml of intravenous blood were withdrawn from the vein in antecubital fossa and placed into plain glass tubes without any anticoagulant. Then immediate spinning of tubes in a centrifuging machine (Champion F-33D) at 2700 rpm for 12 minutes, yielding to a middle gel fibrin rich layer called (PRF). After processing PRF, the blood sample in the test tube was left aside to settle, allowing for the separation into three different layers: The acellular plasma: also called platelet poor plasma, the topmost straw-colored layer that lacks platelet, the PRF clot, rich in fibrin and it includes growth factors and cytokines and the lowest, red fraction consists of erythrocytes.

The tube was removed gently from the device and held still without any hand movement to ensure stability of the gel fibrin, and the (L-PRF) membrane withdrawn from the tube with tissue forceps and put in a sterile dappen dish. It was then held with the prepared resorbable suture to be inserted in the tunnel, secured around the involved teeth, and stabilized after coronally displacing the tunnel to cover the recession tension free and sutured.

Group B: SCTG

Palate was chosen as the donor site for SCTG. The length of the flap was determined previously by combining width of the teeth to be covered using a UNC (University of North Carolina) periodontal probe.

Using a scalpel (blade 15c), a single horizontal incision 2-3 mm below the gingival margin, parallel to the long axis of the palatal surface of the premolar area for an efficient elevation of the split thickness flap. At the same angle of the incision, the blade is perpendicularly directed to the palatal tissue surface straight through the bone where the SCTG was harvested with a new 15c blade and a periosteal elevator. 2 vertical incisions were attempted followed with another horizontal incision to achieve final separation of the graft from the adjacent tissues.

The harvested graft is soaked in a sterile dappen dish with saline, meanwhile the donor site was compressed with wet gauze to eliminate dead space and control bleeding to be sutured later with a 3.0 non resorbable silk suture. After irrigating the recipient site to avoid blood clotting in the created tunnel, the SCTG was removed from the soaked saline, and alternative incisions were made on each edge to expand it and make it able to cover more space in the recipient bed as supported in many studies.

Postsurgical phase

i. **Postsurgical Care**:

Instructions were provided in written and oral forms. Non-steroidal anti-inflammatory drugs NSAIDs (Brufen 400 mg) were given bid for 3 days to control post-surgical discomfort. Antibiotics were not prescribed. Patients were instructed not to brush or floss the surgical site for 3 weeks, instead they were instructed to rinse alternately with salt and water and use a mouthwash (0.12% chlorhexidine digluconate) for 10 days as prescribed. The mouthwash to be used the day after the surgery and the patient was instructed not to manipulate the surgical site or touch

it with his tongue or any other material (for example pulling the lip out to check the surgical site or using floss or a toothbrush ...)

ii. Postsurgical Follow up:

Within 2 weeks, non-resorbable sutures were removed, with reinforcement on oral hygiene instructions and their role in maintaining a favorable oral environment and supporting the surgical treatment outcomes. Professional mechanical plaque removal was performed on every follow up visit whenever scheduled. The patients were reviewed on 3 months and 6 months period postoperatively, and data was recorded at these visits too.

- Wound healing index (WHI) that describes the clinical healing of soft tissues after mucogingival surgeries were recorded at 10 to 14 days post-surgery, 3 months, and 6 months, according to Landry et al., [15, 16].

Statistical analysis

All collected data was organized, tabulated, and analyzed using the Statistical Package for Social Science, (SPSS), version24. Qualitative data were described using numbers and percentages. Quantitative data were described using range, minimum and maximum, mean, standard deviation and median. Confidence level was set to be 95%.

ANOVA test was used for normally quantitative variables, for calculating gingival thickness (GT) and recession depth (RD) between baseline,3 months and 6 months of group A and B respectively and to compare between both groups A and B at baseline and 6 months periods for gingival thickness (GT), probing depth (PD), recession depth (RD), clinical attachment levels (CAL), width of keratinized tissue (WKT). Differences were considered statistically significant for p-values < 0.05.

Paired t test was done to spot significance of difference in probing depth (PD), clinical attachment level (CAL), and width of keratinized tissue (WKT) of each group between baseline and 6 months follow up interval. Differences were considered statistically for p-value <0.05.

The Kruskal-Wallis H test was performed to evaluate significant differences in wound healing index for the dependent variables between different groups of group A and group B. differences were considered statistically significant for $p<0.001$.

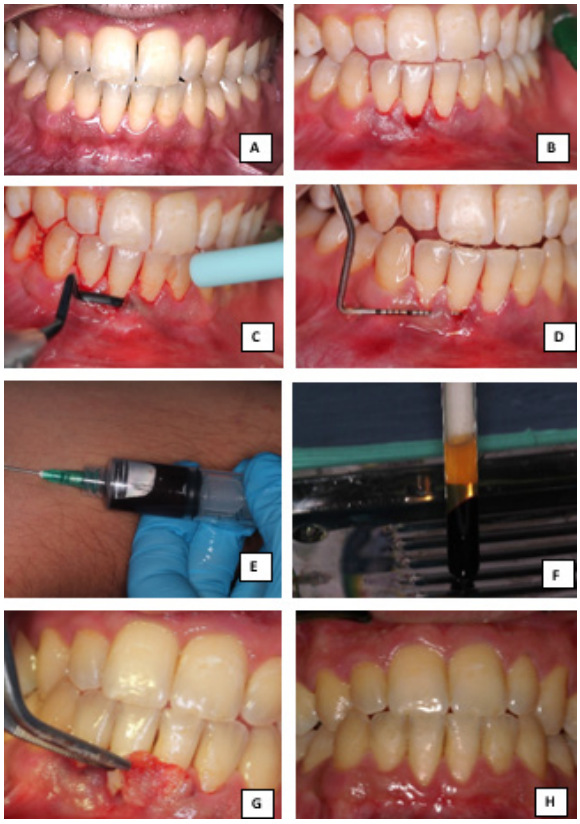

Figure 2: Group A, clinical photos: A) Preoperative clinical photo showing gingival recession on lower central incisors, B) intra-sulcular incision sparing the interdental papilla, C) reflecting the tissues with a tunneling knife, D) ensuring the pathway for the L-PRF, E) venous blood withdrawal from the patient, F) L-PRF tube after centrifugation, G) adaptation of the graft inside the tunnel,H) 6 months follow up.

Figure 3: Group B, A) Preoperative photo showing gingival recession on lower incisors, B) flap elevation mesial and distal to the involved teeth with the tunnel knife, C) preparation of the tunnel to receive the graft, D) palatal single incision to take the SCTG, E) the SCTG in a sterile dish while preparing the recipient site, F) coronal traction of the tunnel while suturing for stabilization of the graft, G) 3 months follow up, H) 6 months follow up.

Results

All subjects completed the study throughout the period of data collection during the different follow up interval periods, 3 months and 6 months as shown in the diagram of the consort form diagram of the study in the appendix section, for evaluation of the following clinical parameters; Full mouth plaque score (FMPS), gingival bleeding index (GBI), CAL, GT, RD, PD, KTW, and recession esthetic score (RES), while wound healing index (WHI) was evaluated at 10-14 days interval, 3 months and 6 months post surgically.

1. Recession depth:

Fig.4 below shows the intragroup comparison of recession depth in group A using the ANOVA test followed by post hoc Tukey HSD which displays a significant difference between the baselines and 3 months (p-value= 0.03428), the baseline and 6 months (0.03428), and no significant difference was shown between 3 months and 6 months (p=0.999). However, intragroup comparison of recession depth in group B showed a significant difference between baseline and 3 months (p-value= 0.00873), baseline and 6 months (0.004992), there was no significant difference however between 3 months and 6 months (p=0.971).

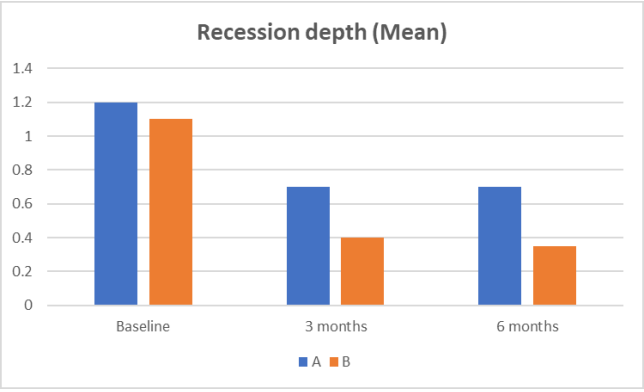

Figure 4: Bar graph representing comparison of Mean Recession Depth between group A and B at baseline, 3 months, and 6 months.

2. Width of keratinized tissue:

The width of keratinized tissue (WKT) in group A indicated a nonsignificant small difference after the paired t test was performed, between the baseline (M = 2.6, SD = 0.6) and 6 months (M = 2.7, SD = 0.6), t (9) = 0.7, p = 0.509. And a large significant difference for group B between baseline (M=2.4, SD= 0.6) and 6 months (M=2.9, SD=0.4), t (9) = 2.6, p=0.029.

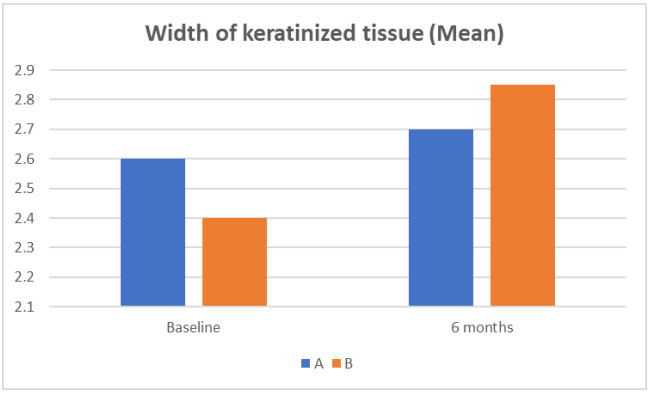

Figure 5: Bar graph representing comparison of Mean width of keratinized tissue between group A and B at baseline, 3 months, and 6 months.

3. Gingival thickness:

The ANOVA test followed by post hoc-Tukey HSD was done to group A for intragroup comparison of gingival thickness (GT) didn't show statistically significant difference between the baselines versus 3 months versus 6 months (p=0.7444). On the other hand, intragroup comparison of GT in group B showed a significance at p<0.05 (p=0.007532), there was a significant difference only between baseline and 6 months (p=0.006541).

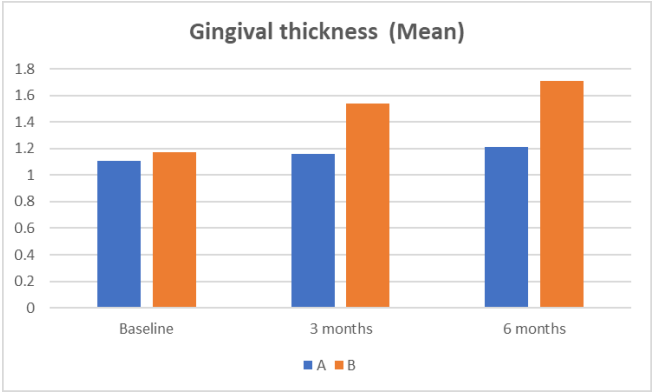

Figure 6, Bar graph representing comparison of Mean Gingival Thickness between group A and B at baseline, 3 months, and 6 months.

4. Wound healing index:

The Kruskal-Wallis H test revealed a significant difference in the dependent variable between the groups in group A, 2(2) = 17.4, p0.001, with a mean rank score of 8.5 for 14 days, 19 for 3 months, and 19 for 6 months. The Kruskal- Wallis H test revealed a significant difference in the dependent variable between groups B and C, 2(2) = 20.96, p.001, with a mean rank score of 6.7 for 14 days, 17.8 for 3 months, and 22 for 6 months.

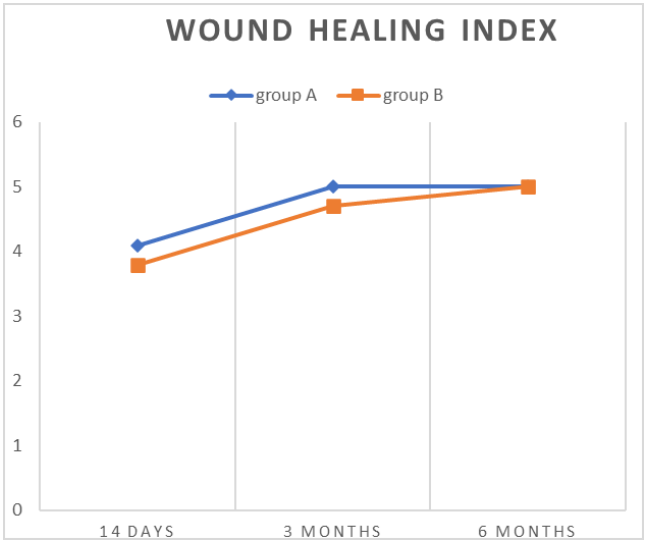

Figure 7, A plot graph comparing Wound healing index between group A and group B at 14 days post-surgery, 3 months, and 6 months.

5. Recession Esthetic Score (RES):

The results of the mean value of RES was statistically significant and higher in group B than group A at both 3 and 6 months postoperative, but it decreased from 7.9 measured at 3 months postoperative to 6.6 at 6 months postoperative. As for group A, it remained stable at 5.7 in both 3 and 6 months postoperative with no statistically significant difference.

Discussion

Gingival recession is a commonly encountered challenge in clinical practice [17]. Marginal gingival recession affects both esthetics and function, leading to root exposure and clinical attachment loss [18, 19]. As such, it necessitates treatment whenever possible to improve tissue characteristics and maintain its integrity [9].

In this study, the tunnel technique was chosen to address gingival recession due to its minimally invasive nature and ability to preserve the papilla while maintaining vascularity at the surgical site to support grafts [16]. The tunnel technique offers benefits such as increased blood supply and graft nutrition, reduced risk of flap dehiscence, and improved morbidity associated with the graft designed [20]. Several clinical studies have demonstrated the effectiveness of the tunnel technique, often in combination with connective tissue grafts (CTG) or soft tissue substitutes [21, 22, 23, 24].

This study contributes to the limited literature comparing leukocytic platelet-rich fibrins (L-PRF) with subepithelial connective tissue grafts in the pouch and tunnel technique for treating Miller's class I and II gingival recession (RT1 according to Cairo classification). Prior research has yielded conflicting results, with some favoring SCTG as the gold standard for recession treatment [2, 22], while others suggest that L-PRF offers comparable clinical results with higher patient acceptance and potential as a leading princip40le in mucogingival surgeries due to its superior wound healing properties and simpler, less time-consuming procedure [3, 11].

Connective tissue grafts remain the gold standard due to their ability to stimulate keratinization of the overlying epithelium [25, 26]. However, the harvesting of grafts from the palate is not considered a simple procedure because it may lead to tissue morbidity and affect the patient's quality of life during the healing process due to the complex palatal anatomy and persistent risk of damaging the palatal artery [20]. Consequently, researchers have sought alternative biomaterials to replace autogenous grafts [30].

Platelet-rich fibrins (PRF) have attracted attention due to their ability to stimulate the microcirculatory system and release growth factors essential for soft tissue healing [31, 32]. L-PRF contains leukocytes that play a crucial role in wound healing and rejuvenation, possessing immune regulatory, angiogenic, lymphogenic, and anti-infectious properties [30].

The study findings revealed a significant increase in gingival thickness for group B (L-PRF) in agreement with previous studies [11]. Age and arch location also influenced the increase in gingival thickness [33]. Several factors affect the phenotype switching from thin to thick like the dimension of the alveolar process, the form and anatomy of the teeth… etc. This was explained by Abraham et al., that thick biotypes showed greater dimensional stability during the remodeling process [32].

In this study, the keratinized tissue width was evaluated using a paired t-test. Group A showed no significant difference between baseline ($M=2.6 \pm 0.6$) and 6 months ($M=2.7 \pm 0.6$). However, in group B, a considerable and significant difference was observed, with the width increasing from $M=2.4 \pm 0.6$ to $M=2.9 \pm 0.4$ over the 6-month period. These findings align with a 2019 systematic review emphasizing the importance of SCTG in recession treatment, supporting its role in maintaining complete root coverage and keratinized tissue width outcomes [33].

Some researchers suggest that a keratinized tissue thickness of up to 1.8 mm can lead to improved clinical results in different root coverage procedures, making it a positive predictor factor for technique effectiveness [34, 35]. This is consistent with another study, in which the keratinized tissue width derived from a one-year follow-up grew somewhat and continued to rise four years later [27]. Which shows that a longer follow-up period is required to adequately investigate the creeping attachment phenomena.

Furthermore, connective tissue grafts aided in gingival phenotypic flipping from thin to thick (i.e., gingival phenotype modification). And this emerged throughout the 6-month follow-up period, which was consis-

tent with Chandra et al.'s study, that also noted that this could assist in establishing creeping attachment [16]. Soldatos et al., demonstrated that creeping attachment occurred twelve months after surgery where not more than 3 mm gingival recession pre-operatively was recorded in their patients. The creeping attachment measured varied from 0.5-2 mm, the width of keratinized tissue did not increase, but the biotype altered from thin to thick [37]. So, in the current investigation, our study interval time was established for a six-month follow-up period as an assumption that it would be enough for the tissue advancement, but it is now clear that longer follow up periods are recommended to further study this phenomenon.

Furthermore, controlling inflammation is important for the effectiveness of mucogingival surgery because postoperative edema generates tension flap, which affects results due to premature suturing loss. Because of the optimal initial healing with minimal surgical discomfort, no visible scar growth, minimally invasive nature, and inherent simplicity in flap elevation and suturing in tunneling [39]. This explains the significant difference in wound healing index between groups A and B, emphasizing L-PRF's healing capability. This is due to the superiority of the growth factors found in this complex and leukocytes [6]. The formation of the first clot stimulates angiogenesis, immunology, and epithelial proliferation, therefore hastening the healing process [40].

Moreover, SCTG demonstrated better esthetic results (RES) at 3 months due to its color blending and phenotype switching properties, but at 6 months, it showed a decrease in recession coverage, likely due to oral hygiene practices or smoking habits of some patients [2, 40, 41]. The tunnelling technique, however, improved esthetic outcomes and patient comfort, with reduced gingival recession and an increase in gingival thickness [43].

The importance of controlling inflammation and maintaining good oral hygiene after surgery was highlighted, as poor hygiene practices led to incomplete root coverage and compromised results [42,43].Supportive periodontal therapy, professional mechanical plaque control, and regular follow-ups were recommended to ensure the stability of results after mucogingival surgeries [44].

Conclusion

Pouch and tunnel technique is a non-invasive mucogingival surgery with a high potential of covering gingival recession defects of Miller's class I and II (RT1 according to Cairo classification). L-PRF is a good novel source for their immune-modulatory properties, relatively ease of preparation and no donor site morbidity. Both grafting modalities in combination with tunnel technique improved gingival phenotype switching in terms of thickness, width, and height are treatment options in the tunnel technique to treat recession defects, with SCTG having higher esthetic and functional results including better color matching, tissue contour and increased width of keratinized tissue.

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