Chapter 88

Use of leukocyte-platelet rich fibrin membrane in the treatment of gingival recession: a case report

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ABSTRACT
Leukocyte-platelet rich fibrin is an aggregate obtained by centrifuging the patient's own blood, it is rich in platelets, growth factors and cytokines and seems to improve the healing of the surgical wound and alleviate postoperative morbidity in cases of root coverage. The aim of this study is to report and discuss a clinical case of multiple gingival recessions treated with the association of the coronary repositioned flap and leukocyte-platelet rich fibrin. Patient, female, 28 years old, complaining of dentinal hypersensitivity and esthetic dissatisfaction. After physical and radiographic examinations, type 1 gingival recessions were observed in teeth 22, 23 and 24. Surgical planning included oblique paramarginal incisions starting from the cementoenamel junction of tooth 23 towards the gingival margin of adjacent teeth, flap detachment, then venipuncture and centrifugation at 2,494 revolutions per minute (700 g) for 12 minutes. At the end of this process, membranes were obtained, which were positioned and sutured over the gingival recessions, followed by coronary repositioning of the surgical papillae. In the postoperative period, satisfactory tissue repair was observed. Although the gold standard for root coverage is connective tissue grafting associated with the coronary repositioned flap, platelet aggregates stimulate the repair and regeneration of soft and hard tissues and can be a great option in some cases. In this clinical case, it was possible to perceive the beneficial effects of the use of leukocyte-platelet rich fibrin membrane in the treatment of gingival recessions.

Keywords: Platelet-rich fibrin, Gingival recession, Periodontics.

1 INTRODUCTION

Gingival recession is clinically characterized by apical displacement of the marginal gingiva with exposure of the root surface and has a multifactorial etiology (Wennstrom, 1966). It can be related to anatomical factors, such as bone fenestrations and dehiscences, abnormal position of teeth in the arch, incorrect sequence of tooth eruption and individual tooth shape (Alldritt, 1968), vestibulopalatine dimension of soft and hard tissues (Wennstron et al., 1987) and amount of inserted gingiva (Novaes & Palioto, 2019); physiological, such as orthodontic movement outside bone boundaries (Wennstron et al, 1987); and pathological factors, such as incorrect use of dental floss and tapes (Everett & Kunkel, 1953),

traumatic brushing (Khocht et al., 1993), perioral and intraoral 'piercings' (Campbell et al, 2002), trauma associated with malocclusion (Tugnait & Clerehugh, 2001), inflammation caused by biofilm accumulation (Baker & Seymour, 1976) and lesions caused by the herpes virus (Prato et al., 2002).

Among the possible treatments for gingival recessions is root coverage, where the main indications are the patient's aesthetic demands, inconsistent and disharmonic gingival margin, reduction of dentin hypersensitivity, and the prevention of caries and cervical non-carious lesions (Chambrone & Tatakis, 2015; Zucchelli & Mounssif, 2015).

Platelet- and leukocyte-rich fibrin (L-PRF) is a platelet aggregate obtained by processing the patient's own blood (Choukroun, 2000), it has platelets, growth factors and cytokines that can cooperate in the healing phases of a surgical wound (Soffer; Ouhayoun; Anagnostou, 2003; Carvalho et al., 2021; Costa & Gomes, 2022).

After periodontal surgical procedure, patients report different experiences regarding postoperative morbidity. Postoperative pain, especially more intense in the first two days after surgery (Mei, Lee & Yeh; 2016), has been shown to be alleviated with the use of L-PRF in cases of alveolar osteitis (Yuce & Komerik, 2021) and also in the removal of free gingival graft, allowing, in the palatal donor area a better wound healing, greater control of bleeding and less postoperative discomfort (Meza-Mauricio et al., 2021).

The aim of this case report is to describe the clinical steps of a root coverage surgery, where the technique of choice was the coronal repositioned flap associated with L-PRF membranes, as well as to present the results obtained during clinical follow-up.

2 METHODOLOGY

The methodology used was case report, aiming at the detailed description and analysis of the surgical procedure (Pereira et al., 2018). During the case planning, the patient received all the information regarding the surgical procedure and postoperative follow-up. Authorizations for the procedure and venipuncture occurred by signing the Informed Consent Form (ICF) contained in the Research Project registered with the Ethics Committee for Research involving Human Beings (CAAE 15414919.7.0000.5231) allowing the use of data, radiographs, and photographs contained in the medical record for scientific publications or academic activities.

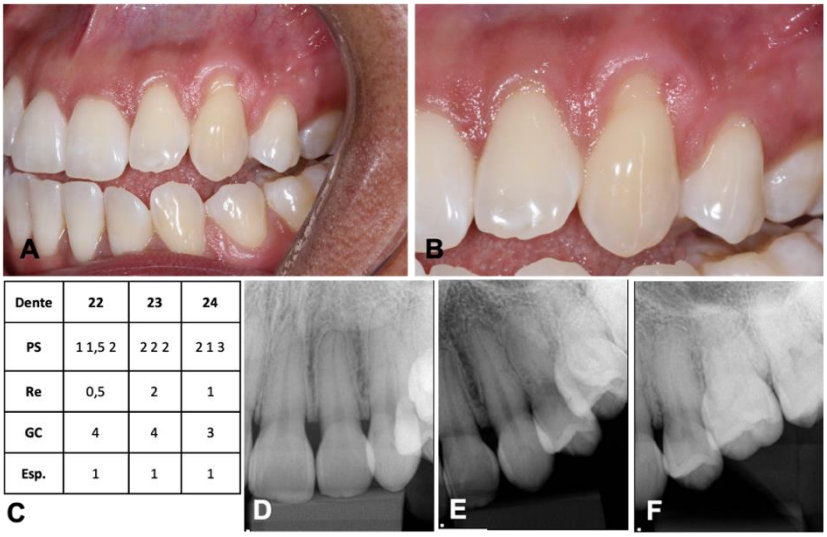
3 CASE REPORT

A 28-year-old female patient came to the University Dental Clinic of the Londrina State University complaining of dentin hypersensitivity and esthetic dissatisfaction.

After physical and radiographic examination, the presence of tissue marginal recession type 1 (RT1) (Cairo et al., 2011) of 0.5 mm, 2 mm and 1 mm on teeth 22, 23 and 24 respectively, with 4 mm of ceratinized/inserted gingiva in the region was found (Figure 1). After supragingival and subgingival

coronal-root scraping and smoothing, biofilm control, and hygiene instruction, we chose to perform root coverage with the coronal repositioned flap (CRF) technique associated with the use of two L-PRF membranes.

Figure 1: Initial appearance of recession type 1 (RT1) (A). Approximate view of elements 22, 23 and 24 (B). Initial clinical parameters (C). Initial periapical X-ray (D, E, F). PS: probing depth; Re: recession height; GC: band of ceratinized gingiva and Esp.: gingival thickness.



Source: The author himself.

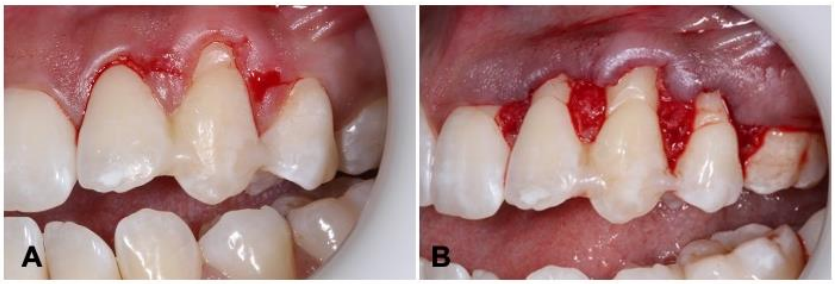
As part of the surgical planning, the contact points between teeth 22 and 23 and 23 and 24 were closed with composite resin (Figure 2) in order to establish an anchor point for the suspension sutures in the transoperative period.

Figure 2: Closure of the contact points with composite resin (A and B).

Source: The author himself.

After rinsing with 0.12% chlorhexidine digluconate and extra oral antisepsis with PVPI we performed local infiltrative anesthesia of the anterior and middle superior alveolar nerves. The preparation of the recipient area began with paramarginal oblique incisions from the CEJ of tooth 23 toward the gingival margin of teeth 22 and 24 according to the technique proposed by Zucchelli and De Sanctis (2000). Next, the flap was folded in a *split-full-split* fashion, and for greater flap mobility in the coronal direction, elements 21 and 26 were tunneled (Figure 3).

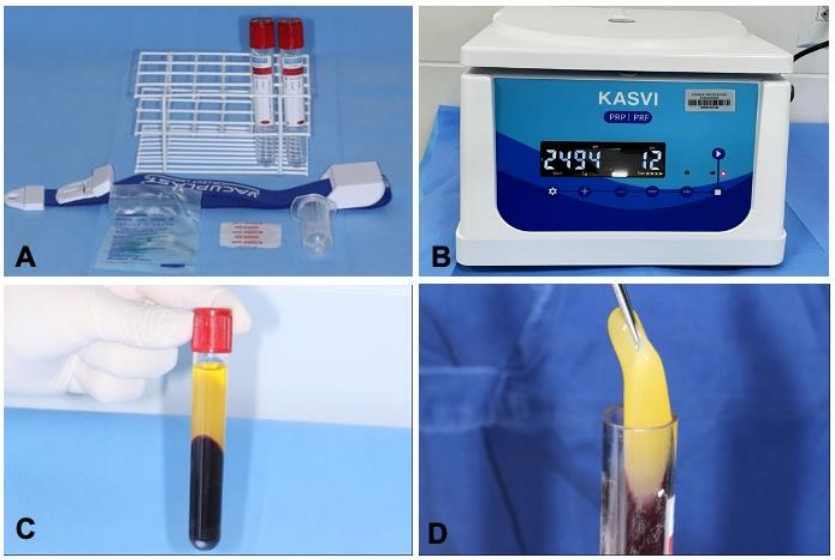
Figure 3: Oblique paramarginal incisions (A), *split-full-split* flap (B).



Source: The author himself.

The protocol followed to obtain the L-PRF membranes began with the collection of 20 ml of blood (2 tubes of 10 ml), centrifuged at 2,494 rpm (700 g) for 12 min in a fixed-angle rotor centrifuge (KASVI - K14-4000PRF). After centrifugation, three layers can be observed in the tube: a red blood cell base (RBC) at the bottom of the tube, acellular plasma, or platelet-poor plasma (PPP) as supernatant, and the L-PRF clot to the medium used for making the membranes (Diss et al., 2008) (Figure 4).

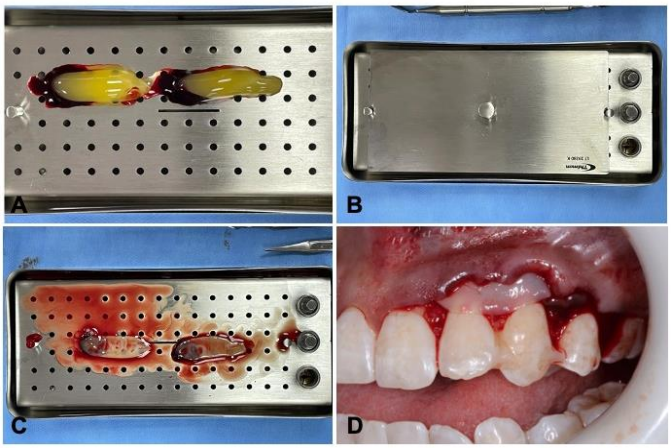
Figure 4: Materials for blood collection (A). Centrifuge in the configuration used: 2494 rpm for 12 min (B). 10ml tube containing the three layers: red blood cell base (RBC) at the bottom, platelet-poor plasma (PPP) as supernatant and the L-PRF clot in the middle (C). L-PRF being removed from the tube (D).



Source: The author himself.

L-PRF clots were sectioned at the height of the *buffy coat* and immediately placed in the box for compression for approximately 3 min. The papillae of the recipient area were de-epithelialized and the root was conditioned with 24% EDTA gel for 3 min. The membranes were overlapped and fixed at the height of the CEJ with *sling* sutures (Vicryl® 6-0) (Figure 5). Finally, the surgical papillae were repositioned coronally with single sutures, vertical cushioning and suspensory sutures anchored to the composite resin (Nylon 5-0) (Figure 6).

Figure 5: L-PRF clots after being sectioned in the *buffy coat* (A). Clots being compressed with the buffy coat for 03 min (B). Membranes with uniform thickness (C). Membranes properly overlapped and positioned in the recipient area (D).



Source: The author himself.

Figure 6: Surgical papillae repositioned coronally with simple sutures using 5-0 nylon thread (A), Suspender sutures anchored to the composite resin also using 5-0 nylon thread (B).

Source: The author himself.

In the immediate post-operative period, a 1-point red laser (2J) was applied to each tooth, and instructions were given on how to care for feeding, brushing, and medications to control pain and prevent infection.

One week after the procedure a satisfactory healing of the region could be observed, and 14 days after surgery the sutures and composite resin anchor points were removed. The patient returned again 90 days and 4 months postoperatively, presenting favorable aesthetics and optimal tissue repair (Figure 7).

Figure 7: Clinical follow-up after 7 days (A), 14 days (B), 90 days (C), and 4 months (D).

Source: The author himself.

After 6 months the periodontal clinical parameters were reassessed. It was found the absence of gingival recession on teeth 22, 23 and 24, showing total coverage of the root surfaces, maintenance of the band of ceratinized gingiva, and a gain in gingival thickness compared to the preoperative situation (Figure 8).

Figure 8: Initial clinical appearance (A), Clinical appearance after 06 months (B), Initial clinical parameters (C), Clinical parameters after 06 months (D). PS: probing depth; Re: gingival recession height; GC: band of ceratinized gingiva; Esp: gingival thickness.

C

Dente	22	23	24
PS	1 1,5 2	2 2 2	2 1 3
Re	0,5	2	1
GC	4	4	3
Esp.	1	1	1

D

Dente	22	23	24
PS	2 1 2	2 1 2	2 1 2
Re	0	0	0
GC	4	4	3
Esp.	>1	>1	>1

Source: The author himself.

4 DISCUSSION

Although it is known that connective tissue grafting associated with coronal repositioned flap is the gold standard when it comes to the treatment of gingival recessions (Chambrone et al., 2008; Cairo et al., 2014; Fernandes et al, 2021), studies show that the use of autogenous grafts is directly related to a higher postoperative morbidity (Miron et al., 2020), and platelet aggregates, given growth factors that stimulate repair and regeneration of soft and hard tissues, may be a viable option in some cases (Moraschini & Barboza, 2016).

In the case presented, two factors were crucial in making the decision regarding not using the connective tissue graft, there was enough keratinized tissue apical to the recessions to maintain periodontal health and gingival thickness of at least 1mm, therefore, there was predictability of root coverage only using the coronal repositioned flap (Stefanini et al., 2018).

Some studies compared the use of the coronal flap to the coronal flap associated with L-PRF. Mancini and colleagues (2021) showed that there were no significant differences between the two techniques in terms of recession reduction, probing depth, and gain of ceratinized tissue, but the coronal flap associated with L-PRF promoted a significant increase in gingival thickness and clinical attachment level when compared to the coronal flap. Miron and co-workers (2020) also observed better results in the association regarding clinical attachment level, keratinized tissue width, and probing depth.

Choukroun et al. (2006) explain that there are 3 important points for soft tissue repair and maturation: angiogenesis, immunity, and epithelial coverage. PRF membranes appear to act simultaneously in the development of these three phenomena. Angiogenesis is the formation of new blood vessels within the wound. For this to occur, there needs to be an extracellular matrix that allows migration, division and phenotype change of endothelial cells. Fibrin matrices enable angiogenesis through a three-dimensional structure of the fibrin gel and by the simultaneous action of cytokines trapped in this mesh. In addition, key soluble factors of angiogenesis are included in the fibrin gel, such as basic fibroblast growth factor (FGFb), vascular endothelial growth factor (VEGF), angiopoietin, and platelet-derived growth factor (PDGF), thus enabling the direct induction of angiogenesis. The immunity promoted by PRF occurs through the degradation of fibrin and fibrinogen products, which trigger numerous chemical events and modulate the response of receptors that allow the adhesion of neutrophils to the endothelium and fibrinogen, and the fibrin and chemotactic agents present in its mesh control the colonization of the wound by macrophages, implying a positive outcome in inflammatory events. During a hemostasis and healing phenomenon, the fibrin clot retains circulating stem cells brought to the injured site thanks to the initial neovascularization. PRF appears to serve as a network for these stem cells, especially when angiogenesis occurs, then develops a fibrin membrane. Thus, the clinical applications of PRF highlight accelerated tissue healing due to the development of neovascularization, wound closure with rapid tissue remodeling, and an almost complete absence of infectious events.

5 CONCLUSION

In the present case we could see the beneficial effects of using L-PRF membrane in the treatment of gingival recessions. In the absence of a palatal donor area there was a reduction in postoperative morbidity, with an excellent clinical result provided by favorable aesthetics with homogeneity of color and texture between the adjacent tissues. It can be concluded that multiple recessions with adequate gingival thickness and band of ceratinized tissue apical to the recession can be successfully treated by coronal repositioned flap associated with L-PRF membrane.

Randomized controlled trials are needed to prove the benefits of L-PRF membrane as an adjunct to the coronal repositioned flap in the treatment of gingival recessions.

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REFERENCES

Alldritt, W. A. (1968). Abnormal gingival form. Proceedings of the Royal Society of Medicine, 61(2), 137–142.

Baker, D. L., & Seymour, G. J. (1976). The possible pathogenesis of gingival recession. A histological study of induced recession in the rat. Journal of Clinical Periodontology, 3(4), 208–219. https://doi.org/10.1111/j.1600-051X.1976.tb00040.x

Cairo, F., Nieri, M., Cincinelli, S., Mervelt, J., & Pagliaro, U. (2011). The interproximal clinical attachment level to classify gingival recessions and predict root coverage outcomes: an explorative and reliability study. Journal of Clinical Periodontology, 38(7), 661–666. https://doi.org/10.1111/j.1600-051X.2011.01732.x

Cairo, F., Nieri, M., & Pagliaro, U. (2014). Efficacy of periodontal plastic surgery procedures in the treatment of localized facial gingival recessions. A systematic review. Journal of Clinical Periodontology, 41, S44–S62. https://doi.org/10.1111/jcpe.12182

Campbell, A., Moore, A., Williams, E., Stephens, J., & Tatakis, D. N. (2002). Tongue Piercing: Impact of Time and Barbell Stem Length on Lingual Gingival Recession and Tooth Chipping. Journal of Periodontology, 73(3), 289–297. https://doi.org/10.1902/jop.2002.73.3.289

Carvalho, N. A. de, Morais, C. E. C., Nascimento, F., Dietrich, L., & Costa, M. D. M. de A. (2021). Aplicabilidade do PRF- fibrina rica em plaquetas na Odontologia e seus benefícios. Research, Society and Development, 10(13), e466101321570. https://doi.org/10.33448/rsd-v10i13.21570

Chambrone, L., Chambrone, D., Pustiglioni, F. E., Chambrone, L. A., & Lima, L. A. (2008). Can subepithelial connective tissue grafts be considered the gold standard procedure in the treatment of Miller Class I and II recession-type defects? Journal of Dentistry, 36(9), 659–671. https://doi.org/10.1016/j.jdent.2008.05.007

Chambrone, L., & Tatakis, D. N. (2015). Periodontal Soft Tissue Root Coverage Procedures: A Systematic Review From the AAP Regeneration Workshop. Journal of Periodontology, 86(2-s), S8–S51. https://doi.org/10.1902/jop.2015.130674

Choukroun, J., Adda, F., Schoeffler, C., & Vervelle, A. (2001). Une opportunite´ en paro-implantologie: Le PRF.

Choukroun, J., Diss, A., Simonpieri, A., Girard, M.-O., Schoeffler, C., Dohan, S. L., Dohan, A. J. J., Mouhyi, J., & Dohan, D. M. (2006). Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part IV: Clinical effects on tissue healing. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology, 101(3), e56–e60. https://doi.org/10.1016/j.tripleo.2005.07.011

Costa, M. O., & Gomes, A. V. S. F. (2022). Aplicações da fibrina rica em plaquetas e leucócitos na Odontologia. Research, Society and Development, 11(7), e36811730069. https://doi.org/10.33448/rsd-v11i7.30069

Diss, A., Dohan, D. M., Mouhyi, J., & Mahler, P. (2008). Osteotome sinus floor elevation using Choukroun's platelet-rich fibrin as grafting material: a 1-year prospective pilot study with microthreaded implants. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology, 105(5), 572–579. https://doi.org/10.1016/j.tripleo.2007.08.021

Everett, F. G., & Kunkel, P. W. (1953). Case Report: Abrasion Through the Abuse of Dental Floss. Journal of Periodontology, 24(3), 186–187. https://doi.org/10.1902/jop.1953.24.3.186

Fernandes, T. C. de M., Sega, K. R., Costa, P. P., Ito, F. A. N., Maia, L. P., & Pedriali, M. B. B. P. (2021). Associação de retalho reposicionado coronário, proteína derivada da matriz do esmalte e enxerto de tecido conjuntivo subepitelial como tratamento de recessões gengivais múltiplas: Relato de caso. Research, Society and Development, 10(3), e17510313190. https://doi.org/10.33448/rsd-v10i3.13190

Khocht, A., Simon, G., Person, P., & Denepitiya, J. L. (1993). Gingival Recession in Relation to History of Hard Toothbrush Use. Journal of Periodontology, 64(9), 900–905. https://doi.org/10.1902/jop.1993.64.9.900

Mancini, L., Tarallo, F., Quinzi, V., Fratini, A., Mummolo, S., & Marchetti, E. (2021). Platelet-Rich Fibrin in Single and Multiple Coronally Advanced Flap for Type 1 Recession: An Updated Systematic Review and Meta-Analysis. Medicina, 57(2), 144. https://doi.org/10.3390/medicina57020144

Mei, C.-C., Lee, F.-Y., & Yeh, H.-C. (2016). Assessment of pain perception following periodontal and implant surgeries. Journal of Clinical Periodontology, 43(12), 1151–1159. https://doi.org/10.1111/jcpe.12618

Meza-Mauricio, J., Furquim, C. P., Geldres, A., Mendoza-Azpur, G., Retamal-Valdes, B., Moraschini, V., & Faveri, M. (2021). Is the use of platelet-rich fibrin effective in the healing, control of pain, and postoperative bleeding in the palatal area after free gingival graft harvesting? A systematic review of randomized clinical studies. Clinical Oral Investigations, 25(7), 4239–4249. https://doi.org/10.1007/s00784-021-03933-5

Miron, R. J., Moraschini, V., del Fabbro, M., Piattelli, A., Fujioka-Kobayashi, M., Zhang, Y., Saulacic, N., Schaller, B., Kawase, T., Cosgarea, R., Jepsen, S., Tuttle, D., Bishara, M., Canullo, L., Eliezer, M., Stavropoulos, A., Shirakata, Y., Stähli, A., Gruber, R., … Sculean, A. (2020). Use of platelet-rich fibrin for the treatment of gingival recessions: a systematic review and meta-analysis. Clinical Oral Investigations, 24(8), 2543–2557. https://doi.org/10.1007/s00784-020-03400-7

Moraschini, V., & Barboza, E. dos S. P. (2016). Use of Platelet-Rich Fibrin Membrane in the Treatment of Gingival Recession: A Systematic Review and Meta-Analysis. Journal of Periodontology, 87(3), 281–290. https://doi.org/10.1902/jop.2015.150420

Novaes, A. B., & Palioto, D. B. (2019). Experimental and clinical studies on plastic periodontal procedures. Periodontology 2000, 79(1), 56–80. https://doi.org/10.1111/prd.12247

Pereira, A. S., Shitsuka, D. M., Parreira, F. J., & Shitsuka, R. (2018). Metodologia do trabalho científico. UFSM. https://repositorio.ufsm.br/bitstream/handle/1/1582 4/Lic_Computacao_Metodologia-Pesquisa-Cientifica.pdf

Prato, G. P., Rotundo, R., Magnani, C., & Ficarra, G. (2002). Viral Etiology of Gingival Recession. A Case Report. Journal of Periodontology, 73(1), 110–114. https://doi.org/10.1902/jop.2002.73.1.110

Soffer, E., Ouhayoun, J. P., & Anagnostou, F. (2003). Fibrin sealants and platelet preparations in bone and periodontal healing. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology, 95(5), 521–528. https://doi.org/10.1067/moe.2003.152

Stefanini, M., Marzadori, M., Aroca, S., Felice, P., Sangiorgi, M., & Zucchelli, G. (2018). Decision making in root-coverage procedures for the esthetic outcome. Periodontology 2000, 77(1), 54–64. https://doi.org/10.1111/prd.12205

Tugnait, A., & Clerehugh, V. (2001). Gingival recession—its significance and management. Journal of Dentistry, 29(6), 381–394. https://doi.org/10.1016/S0300-5712(01)00035-5

Wennström, J. L. (1996). Mucogingival Therapy. Annals of Periodontology, 1(1), 671–701. https://doi.org/10.1902/annals.1996.1.1.671

Wennstrom, J. L., Lindhe, J., Sinclair, F., & Thilander, B. (1987). Some periodontal tissue reactions to orthodontic tooth movement in monkeys. Journal of Clinical Periodontology, 14(3), 121–129. https://doi.org/10.1111/j.1600-051X.1987.tb00954.x

Yüce, E., & Kömerik, N. (2019). Potential effects of advanced platelet rich fibrin as a wound-healing accelerator in the management of alveolar osteitis: A randomized clinical trial. Nigerian Journal of Clinical Practice, 22(9), 1189. https://doi.org/10.4103/njcp.njcp_27_19

Zucchelli, G., & de Sanctis, M. (2000). Treatment of Multiple Recession-Type Defects in Patients With Esthetic Demands. Journal of Periodontology, 71(9), 1506–1514. https://doi.org/10.1902/jop.2000.71.9.1506

Zucchelli, G., & Mounssif, I. (2015). Periodontal plastic surgery. Periodontology 2000, 68(1), 333–368. https://doi.org/10.1111/prd.12059