

CURRENT TRENDS IN GINGIVAL RECESSION COVERAGE—PART I: THE TUNNEL CONNECTIVE TISSUE GRAFT

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The recession of the gingiva is increasingly becoming a more prominent condition in the oral health of many patients and should be treated at its earliest detection. The multifactorial etiology, decision modality, and current trends followed in the treatment of gingival recession are discussed in this presentation. The correction of Class I and II gingival recessions are presented as a means of minimizing surgical trauma and achieving predictable aesthetic results. Part II of this discussion will present alternative techniques in treating gingival recession.

Learning Objectives:

This article describes the nature and causes of gingival recession and presents several treatment therapies aimed at correcting it. Upon reading this article, the reader should:

- Understand why gingival recession is a serious concern both functionally and aesthetically for the soft and hard tissue.
- Become familiar with the causes of gingival recession and learn how the tunnel connective tissue graft technique can be used to correct it.

Key Words: gingival recession, coronally positioned flap, tunneling procedure, platelet-rich plasma, enamel matrix derivative, surgical trauma

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Gingival recession is a common occurrence and its prevalence increases with age.¹ The recession of the gingiva, either localized or generalized, may be associated with one or more surfaces, resulting in attachment loss and root exposure, which can lead to clinical problems such as root surface hypersensitivity, root caries, cervical root abrasions, difficult plaque control, and diminished cosmetic appeal and aesthetic concern. Marginal gingival recession, therefore, can cause major functional and aesthetic problems,² and should not be viewed as merely a soft tissue defect, but rather as the destruction of both the soft and hard tissue. Treatment proposals for this type of defect have evolved based on the knowledge for healing the gingiva and the attachment system.

Multifactorial Gingival Recession Etiology

Periodontal marginal tissue recessions have numerous causes, but there is a consensus about the gingival recession etiology.³

1. An anatomical condition with a pre-existing or acquired alveolar bone dehiscence combined with localized prominent tooth malposition,⁴ inadequate keratinized gingival dimensions in quality and quantity,⁵ high muscle attachment, and frenum pull.⁶
2. Occlusal disturbances and parafunctional habits. Cervical dental abrasions, also called noncarious cervical lesions (NCCL), have long been thought to be caused by excessive brushing. Controversy over this concept and occlusal etiology still exists. A study was conducted by Miller et al to verify the occurrence of signs of excessive brushing or occlusal disturbances associated with abfractions.⁷ NCCL coexist almost systematically with occlusal wear facets (94.5%) and lack of canine disclusion (77.2%). The study concluded that clinical signs of excessive brushing were lacking, whereas signs of occlusal disturbance were very consistent with the presence of abfractions.
3. Traumatic, overzealous tooth brushing techniques (ie, forceful, horizontal) frequently associated with a pre-existing lack of cortical bone, or acquired bone dehiscence.



Figure 1. Class I gingival recession on the right maxillary canine and lateral incisor.



Figure 2. Class II gingival recession on the left maxillary canine and lateral incisor.

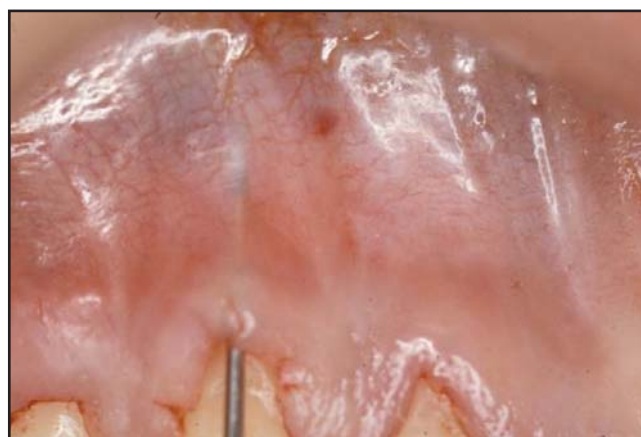


Figure 3. Vertical sounding with a probe of the tunnel created beyond the MGJ.



Figure 4. Transversal sounding of the tunnel without detaching the peak of the papillae.



Figure 5. Large and thick CTG after palatal harvesting.



Figure 6. The CTG is inserted in the tunnel and the flap is advanced and sutured with the graft.

4. Uncontrolled marginal inflammation with accumulation of dental plaque due to improper brushing techniques.
5. Iatrogenic factors related to periodontal, orthodontic,⁸ and periodontal/restorative procedures on thin biotype (eg, gingivectomy, apically positioned flap, tooth overpreparation violating the biologic width, incorrect fitting of the restoration with overcontouring or a gap between the margin of the crown and the tooth structure).⁹
6. No evident clinical etiology in 17% of gingival recessions cases.¹⁰

Treatment Planning Decision Modality

If the recession is not progressing and does not provoke tooth sensitivity or poor aesthetics, then tooth-brushing instructions and regular observation through a strict maintenance program would be the optimal treatment. Progressive gingival recession in the presence of high thermal sensitivity and/or compromised aesthetic appearance should be treated with surgical root coverage in Class I and II defects.³

Thorough plaque control is the primary condition for the success of any periodontal surgery. Smoking is a contraindication for plastic periodontal surgery due to:

- Associated gingival vasoconstriction that often causes necrosis of the soft tissues;
- Lack of adherence of the fibroblasts¹¹; and
- Alteration in immune response.¹²

The ideal surgical objective is covering the root up to the cemento-enamel junction with a probing depth of less than 2 mm without probe-induced bleeding. The principal challenge lies in obtaining an excellent blood supply for the covering tissues to avoid possible necrosis and root coverage failure.¹³ It is always important to select the periodontal procedure that allows the best aesthetic result, while causing the least amount of trauma.

Miller prescribes complete disclosure at the initial consultation concerning the root coverage that can realistically be obtained through the selected form of treatment (Table 1).⁷

A number of reports published on recession treatment emphasize the size of the presurgical defect and its effect on clinical outcomes; in other words, the deeper

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Table 1

<i>Miller's Classification of Recession-Type Defects¹⁴</i>		
Class	Condition of Recession	Success Percentage (possible)
Class I	Recession does not extend to the mucogingival junction and is not associated with interdentalbone resorption.	100%
Class II	Recession extends beyond the mucogingival junction with no interdental bone resorption.	100%
Class III	Recession is associated with interdental proximal bone resorption and one proximal root exposition.	50% to 70%
Class IV	There is mesial and/or distal proximal bone resorption with exposure of more than one proximal root surface. The papillae are at the same level as the recession.	0% to 10%

Table 2

<i>Prerequisites of Gingival Recession Surgery</i>	
Indications	Contraindications
Small amount of keratinized gingiva	Insufficient or inefficient patient hygiene
Class I or II recessions	Smoking patient
Aesthetic concerns	Desquamative gingivitis
Single or multiple recessions	
Large and deep recessions	
Exposed root sensitivities	

and narrower the defect, the greater the achieved root coverage. Deeper recessions (ie, 4 mm or more) had greater attachment level gains than shallow (ie, less than 4 mm) recessions.¹⁴⁻¹⁷ The mean percentage of root coverage reported for the subepithelial CT grafts technique varies between 65% and 98%, while the percentage of complete root coverage ranges from 0% to 90% depending on the recession classification.¹⁸

Various Treatment Protocols

Numerous procedures and different techniques have been designed to provide predictable root coverage in order to solve these problems. Conventional mucogingival surgery includes the following steps:

- The free gingival graft, known to correct mucogingival problems (ie, lack of keratinized tissues), is used for root coverage.^{17,19,20}
- The laterally full pedicle flap will be used if a large and thick strip of keratinized tissue is present on the adjacent teeth.^{21,22}
- The splitthickness laterally sliding flap is a modification of the previous procedure.²³
- The advanced coronally repositioned flap can be used when the keratinized gingival tissue apical to the recession is greater than or equal to 3 mm. Different modifications have been described including the following:
 - Two vertical incisions are made extending beyond the mucogingival junction. An extension of the intrasulcular incision, however, can avoid the vertical incision with the interposition of a membrane integrating the guided tissue regeneration (ie, resorbable and nonresorbable membrane and alloderm) within the root coverage techniques.^{16,24}
 - The semilunar coronally repositioned flap technique requires the oral surgeon to make a semilunar incision parallel to the free gingival margin of the facial tissue, a partial dissection, and coronally positioning this tissue over the denuded root.²⁵
 - The CTG procedure^{26,28} permits grafting in a number of ways: under a flap repositioned to its initial position, under a coronally or a



Figure 7. Right maxillary 6 months postoperation.

laterally positioned flap, under a double papillae flap, or with a tunnel technique covered by undetached papillae tips.²⁹

Clinical Case Presentation

Patient selection criteria for all the clinical cases discussed in this presentation include:

- Nonsmokers;
- Patients 18 years and older;
- Buccal recession defects (2.5 mm or greater) classified as either Class I or II defects on the maxillary teeth or premolars;
- Radiographic evidence of sufficient interdental bone (ie, the distance between the crestal bone and the cemento-enamel junction is no greater than 2 mm);
- Clinical indication and/or patient request for recession coverage;
- Gingival thickness of at least 0.5 mm at a point located 3 mm below the free gingival margin;
- A minimum of 2 mm of keratinized gingiva; and
- Good oral hygiene (Table 2).

The selected teeth were vital, free of restorations, bleed-free upon probing after the initial preparation, and had not been treated surgically for at least 2 years. After obtaining adequate anesthesia, the exposed root surfaces of patients were scaled and planed utilizing ultrasonic hand instruments. The root surfaces were then reshaped with a smooth diamond bur and polished with a prophylax jet.



Figure 8. Improved gingival thickness and color harmony can be seen in left maxillary.

Table 3

Tunnel Connective Tissue Graft	
Advantages	Disadvantages
Excellent adaptation on the recipient site	Traumatic surgery for the patient
Highly aesthetic results	Requires two surgical sites
High vascularization by the advanced flap	Delicate harvesting of the graft
Increased thickness of the keratinized gingiva	Difficult stabilization of the graft
Harmony in the gingival color/texture	Palatal graft has limited quantity and thickness
	Lengthy surgery/healing

Tunnel Connective Tissue Graft (TCTG)^{30,31}

A 19-year-old female presented whose chief complaint was root sensitivity and poor aesthetics on her maxillary lateral incisors and canines (Figures 1 and 2). The tunnel technique was selected to treat both sides simultaneously presenting with Class I and II gingival recession (Figures 3 and 4). A sulcular incision was designed on both sides, from the first premolar to the central incisors, and a partial dissection was carefully performed in order to create a deep pouch beyond the mucogingival junction while keeping the tip of the interproximal papillae attached to the teeth below the proximal contact point. A primary flap on the right and left palatal sites with one line of incision allows the harvesting of thick, sizable

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Figure 9. Full-mouth view 1-year postoperation showing total coverage of the gingival recessions on both sides.

connective tissue (Figure 5). The primary flap was immediately sutured to prevent bleeding (Figure 6).

The CTG, using 4-0 sutures, was delicately inserted inside the pouch and was then stabilized with the flap using 5-0 Vicryl sutures. The healing progressed uneventfully and the gingival recession was totally covered with a beautiful aesthetic result on both sides (Figures 7 through 9) (Table 3).

Conclusion

The surgical technique of choice depends on several factors, each having their advantages and disadvantages. The clinician should choose from among the different surgical protocols available, selecting the least traumatic to the patient. This part of the presentation presented a tunnel CTG technique to correct gingival recession. Part II will present minimally invasive procedures for the patient, limited to only one site of surgery—one using enamel matrix derivative and other procedure using the platelet-rich fibrin.

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CONTINUING EDUCATION (CE) EXERCISE No. 14



To submit your CE Exercise answers, please use the answer sheet found within the CE Editorial Section of this issue and complete as follows: 1) Identify the article; 2) Place an X in the appropriate box for each question of each exercise; 3) Clip answer sheet from the page and mail it to the CE Department at Montage Media Corporation. For further instructions, please refer to the CE Editorial Section.

The 10 multiple-choice questions for this Continuing Education (CE) exercise are based on the article "Current Trends in Gingival Recession Coverage—Part I: The Tunnel Connective Tissue Graft," by André P. Saadoun, DDS, MS. This article is on Pages 433-438.

1. Periodontal recession is often associated with which of the following?
 - a. Root decay.
 - b. Aesthetic problems.
 - c. Abrasion of the enamel/cementation.
 - d. All of the above.
2. Which of the following best describes Miller's Class II condition?
 - a. Recession without loss of the interproximal bone.
 - b. Recession with loss of the interproximal bone.
 - c. Recession not reaching the MBG.
 - d. None of the above.
3. What factors determine the choice of the surgical technique?
 - a. The depth of the buccal vestibule.
 - b. The depth and width of the recession.
 - c. The quality and quantity of the keratinized gingiva.
 - d. All of the above.
4. Which of the following prognoses is NOT correct?
 - a. Total coverage for Class I and class II.
 - b. Partial coverage for Class III.
 - c. Partial coverage for Class IV.
 - d. No coverage for Class IV.
5. The amount of gingival recession that can be corrected depends on which of the following?
 - a. The surgical technique.
 - b. The class of the recession.
 - c. The root surface preparation.
 - d. All of the above.
6. Which surgical technique is NOT described in this article?
 - a. The epithelio-connective graft.
 - b. The tunneling connective graft technique.
 - c. The connective graft covered with a lateral pedicle flap.
 - d. Both a and c.
7. Which of the following procedures is the most traumatic for the patient?
 - a. The tunnel connective graft.
 - b. The coronally repositioned flap with PRF.
 - c. The coronally repositioned flap with EMD.
 - d. None of the above.
8. What is the main disadvantage of the tunnel connective graft technique?
 - a. The minimum postoperative edema.
 - b. The necessity of two surgical sites.
 - c. The slower time of the surgery.
 - d. The facility of graft harvesting.
9. Which is a contraindication to gingival recession surgery?
 - a. The patient smokes.
 - b. Large and deep recessions.
 - c. Exposed root sensitivities.
 - d. All of the above.
10. If the recession is not progressing, which is the best treatment option?
 - a. Regular examinations.
 - b. Adequate home maintenance.
 - c. Both a and b.
 - d. Neither a nor b.