

Treatment of localized gingival recessions with free gingival graft

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ABSTRACT

Mucogingival therapy is a general term describing nonsurgical and surgical treatment procedures for the correction of defects in morphology, position, and/or amount of soft tissue and underlying bony support around teeth and dental implants. The free gingival graft is a reliable mucogingival surgical procedure for increasing the zone of attached gingiva at the buccal or lingual aspect of a single tooth, or groups of teeth, or for covering areas of gingival recession. In this review; using free gingival grafts for treating localized gingival recessions have been outlined in the light of current knowledge.

Key words

Free gingival graft, gingiva, gingival recession, mucogingival surgery

INTRODUCTION

Mucogingival surgery is defined as periodontal surgical procedures designed to correct defects in the morphology, position, or enhance the dental gingival junction, since defects in the morphology of the gingival and alveolar mucosa can accelerate the course of periodontal disease, or interfere with the successful outcome of periodontal treatment.^[1]

The most common mucogingival problems are decreased amount of attached gingiva because of gingival recessions and lack of adequate vestibular depth in clinical practice. Decreased amount of attached gingiva and vestibular depth may make it difficult for plaque control to be performed and predispose such an area to gingival inflammation. Furthermore aberrant frenulum or muscle attachment may also make plaque control difficult and cause gingival recession.^[2,3]

Clinical significance of attached gingiva

The gingiva is divided anatomically into marginal, attached and interdental.^[4] The attached gingiva is defined as the tissue between the mucogingival junction and the

projection on the external gingival surface of the most apical portion of the gingival sulcus or the periodontal pocket. The attached gingiva is firm, resilient and tightly bound to the underlying periosteum of alveolar bone or to the root surface. The width of the attached gingiva is genetically predetermined, varies in different areas of the dentition [generally greatest in the incisor region and narrower in the posterior region], and its width can increase with age and supraerupted teeth.^[3,5]

The presence of a thick keratinized gingiva serves as a protective barrier for the physical trauma of mastication and the thermal and chemical stimuli from the dietary components having direct contact with the gingiva.^[3]

The necessity of a band of attached gingiva for maintenance of optimal periodontal health is controversial in the literature. While Lang and Løe suggested that 2 mm of gingiva is an essential precondition for periodontal health,^[6] Miyasato *et al.*, demonstrated that clinically healthy gingiva can exist in areas with minimal or no attached gingiva with proper oral hygiene and absence of bacterial plaque.^[7]

Even though it is possible for gingival health to exist in areas of minimum or no attached gingiva, it is commonly accepted that areas with less than 2 mm of attached gingiva are at a higher risk for recession.^[3]

GINGIVAL RECESSION

Gingival recession is the exposure of the root surface due to an apical shift of the gingival margin.^[8] Marginal

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gingival tissue recession is associated with thermal and tactile sensitivity, esthetic complaints, and a tendency toward cervical root abrasion and root caries.^[3,8]

There are four main etiological factors that can lead to gingival recession:

- a. Periodontal disease: In periodontal disease, the interaction between bacterial infection and immune response of the host causes matrix degradation, alveolar bone resorption, and apical migration of the epithelium, resulting in periodontal pockets, gingival recession, or a combination of both.^[8]
- b. Mechanical forces: A common cause of gingival recession is an aggressive use of the toothbrush which progressively abrades the gingival tissue. Occlusal traumatism is also an etiological factor in mucogingival problems.^[8]
- c. Iatrogenic factors: Labial movement of the teeth by orthodontic forces may result in the loss of the alveolar buccal plate, followed by gingival recession. Crown preparations extending subgingivally and impression techniques involving gingival retraction may be the reason for localized gingival recession. Poorly designed partial dentures can cause gingival recession around abutment teeth.^[8]
- d. Anatomical factors: Narrow apicocoronal dimension of the gingival tissue, decreased buccolingual thickness of the attached gingiva, lack of adequate vestibular depth, alveolar bone dehiscences, high frenum pull, and tooth position are anatomical factors correlated with gingival recession.^[3,8]

Classifications of gingival recession

Root coverage is the one of the primary targets of mucogingival surgery. The need to classify recession areas according to their potential to be covered became necessary among clinicians. Sullivan and Atkins published the first classification of gingival recession according to its amenability of being covered using mucogingival surgical procedures. The basis of their gingival recession classification was according to the depth and width of the recession defect. The four categories to describe defects were: deep wide, shallow wide, deep narrow and shallow narrow.^[3] Miller presented an expanded classification, which is probably the most widely used today. Miller's classification system is as follows:^[3,8]

- Class I: marginal tissue recession not extending to the mucogingival junction. No loss of interdental bone or soft tissue. Complete root coverage can be anticipated.
- Class II: marginal recession extending to or beyond the mucogingival junction. No loss of interdental bone or soft tissue. Complete root coverage can be anticipated.
- Class III: marginal tissue recession extends to or beyond the mucogingival junction. Loss of bone or soft tissue, apical to the cemento enamel junction but coronal to the level of the recession defect.

Partial root coverage can be anticipated.

- Class IV: marginal tissue recession extends to or beyond the mucogingival junction. Loss of bone or soft tissue apical to the level of the recession defect. No root coverage can be anticipated.

Treatment modality

Currently, numerous surgical techniques are proposed for root coverage. These procedures are as follows:^[9]

- I. Pedicle soft tissue grafts
 - Rotational flaps: Laterally positioned flap, Double papilla flap
 - Advanced flaps: Coronally positioned flap, Semilunar flap
- II. Free soft tissue grafts
 - Nonsubmerged graft: One stage [free gingival graft]
 - Two stage [free gingival graft+coronally positioned flap]
 - Submerged grafts: Connective tissue graft + laterally positioned flap
 - Connective tissue graft + double papilla flap
 - Connective tissue graft + coronally positioned flap
 - Envelope technique.
- III. Additive treatments
 - Root surface modification agents
 - Enamel matrix proteins
 - Guided tissue regeneration: Nonresorbable membrane barriers
 - Resorbable membrane barriers

History of free gingival graft

Bjorn in 1963, and Sullivan and Atkins in 1968, were the first to describe the free gingival graft.^[10] The free gingival graft was initially used to increase the amount of attached gingiva and extend the vestibular depth. Later it was used to attempt coverage of exposed root surfaces. Simple and highly predictable when used to increase the amount of attached gingiva, it is also quite versatile: it can also be used over an extraction socket or osseous graft.^[10,11]

INDICATIONS

Free gingival grafts are used for:

- Increasing the amount of keratinized tissue (more specifically attached gingiva)
- Increasing the vestibular depth
- Increasing the volume of gingival tissues in edentulous spaces (preprosthetic procedures)
- Covering roots in areas of gingival recession.^[10]

Root coverage success and predictability of free gingival grafts

Sullivan and Atkins proposed that, whereas the traditional thin free grafts showed success in root coverage of small to moderate gingival defects, the deep and wide lesions had less chance of success. The thick (2 mm or more)

free mucosal graft for root coverage as described by Miller demonstrated improved root coverage, especially when applied to Miller Class I and II lesions, irrespective of their width and depth.^[3] It has been demonstrated that the success of free gingival grafts in root coverage is lower compared to other surgical procedures [Table 1].^[12] The connective tissue graft is often used for root coverage because of its greater predictability in obtaining root coverage and better esthetic outcomes.^[13,14]

Areas presenting with a lack of keratinized tissue and gingival recession can be effectively treated with the free gingival graft to create an adequate zone of attached gingiva and coverage of the exposed root. Gingival recession regions, in the absence of a mucogingival problem, in which there is an aesthetic or hypersensitivity consideration, can be also managed with a free gingival graft. Two clinical situations can be identified, however, in which the free gingival graft has advantages over the subepithelial connective tissue graft for root coverage, which appears to be the most widely used procedure of root coverage. These situations share one common feature: the need for an increase in the vertical dimension of the gingival tissue.^[3]

The first situation is that of areas that present with decreased vestibular depth, with or without a coronal frenum attachment. Treatment of such areas with the subepithelial connective tissue graft results in little apicocoronal increase of the attached gingiva by virtue of positioning the flap at its original level to cover the graft.^[3]

The second clinical situation in which the free gingival graft may be the surgical method relates to restorative dentistry. It has been suggested that 5 mm of keratinized tissue is desirable to prevent recession in areas where a restoration with subgingival margin is planned.^[15] Treatment of a mucogingival problem on such teeth, including the coverage of previously exposed root surfaces, can be predictably achieved with the free gingival graft because it provides an extensive apicocoronal increase of keratinized tissue. The subepithelial connective tissue graft, on the other hand, which may result in root coverage, results in little, if any, increase in the

apicocoronal dimension of the keratinized tissue.^[3] Successful root coverage can be achieved with a free gingival graft if appropriate case is selected [Figure 1].

Factors related to success

- 1) Adequate blood supply from the tissues adjacent to the graft bed is the most essential factor for the survival of the grafted tissue over the avascular root surface.^[3]



Figure 1: Treatment of localized gingival recessions with free gingival graft (Left side baseline, right side after treatment)

Table 1: The amount of root coverage obtainable with various procedures

Root coverage procedure	No. of studies	Root coverage	
		Mean % of initial recession	Range %
Rotational flaps	10	68	41-74
Coronally advanced flap	17	79	55-99
Guided tissue regeneration	35	75	48-94
Enamel matrix proteins	10	86	72-94
Free connective tissue graft	33	86	53-98
Epithelialized free soft tissue graft	16	63	11-87

- 2) Case selection based on the classification of gingival recession as proposed by Miller is crucial to the predictability of the surgical outcome. Root coverage can only be anticipated to occur to the level of the interproximal gingival tissue.^[3]
- 3) Wide interdental papillae will provide more abundant blood supply to the grafted tissue as compared to narrow ones. In cases where narrow papillae are present; bed preparation should be extended to the apicocoronal direction in order to increase the vascular- avascular ratio in the recipient area.^[3]
- 4) The incision types at the bed site are also important as means to optimize blood supply to the graft. Horizontal and vertical incisions should be made at a 90° angle, in a butt joint fashion. Beveled incisions may cause a tendency for the graft to slide over the incision lines. This situation results in dead space between the graft and the graft bed and, therefore, blood supply may be compromised. The vertical incisions in the recipient site should be placed close to the line angles of the adjacent teeth in order for wide surgical papillae to be present and consequently facilitate suturing and maximize blood supply from the papillary areas.^[3,16]
- 5) The dimensions and border characteristics of the graft itself will also impact root coverage success because they affect blood flow. The size of the graft is determined by the size of recipient site. A graft that is smaller than the recipient site is at a high risk for failure because it will have no direct contact with the periphery of the recipient site and blood flow will be impaired.^[3,16]
- 6) The thickness of a free gingival graft needs to be increased for root coverage.^[3]
- 7) The stabilization and immobilization of the graft has a crucial role for success. Adequate suturing will promote stabilization and immobilization of the graft and prevent it from being dislodged in the healing process. Lack of good adaptation between the graft and underlying vascular and avascular portion of the recipient site or its borders may result in necrosis of the grafted tissue.^[3,16]
- 8) Trauma to the graft in early healing period may result in failure.^[16]
- 9) A direct correlation between root coverage failure with a free gingival graft and smoking [more than 10 cigarettes/day] has been established.^[3,16,17]

Advantages and disadvantages

The free gingival graft appears to be the best treatment alternative to increase the amount of attached gingiva and for the treatment of gingival recession is combined with lack of adequate vestibular depth and for teeth requiring root coverage prior to receiving a restoration with subgingival margins. With appropriate case selection, this technique is predictable in achieving complete root coverage.^[3]

The disadvantages of the free gingival graft for root coverage include increased discomfort and potential for postoperative bleeding from the donor area by virtue of a large wound that heals by secondary intention. Compared with other soft tissue techniques for root coverage, the free gingival graft results in an unpredictable color match between the grafted tissue and adjacent gingival tissues. Grafted tissue with a lighter color than desired may persist for long periods of time after the initial healing. Selection of the palatal donor site should avoid the rugae areas because they may persist in the grafted tissue for as long as 9 years and consequently compromise aesthetics.^[3,6] Interestingly, an exostosis can occur beneath the periosteum after free gingival graft procedure. It is thought that surgical trauma may stimulate the bony exostosis response.^[18,19]

CONCLUSIONS

The free gingival graft for root coverage is still a feasible and effective treatment procedure in mucogingival surgery. Despite the fact that other effective root coverage techniques have been described, the free gingival graft may still be the best treatment choice for gingival recession when an increase in the apicocoronal amount of the keratinized gingival tissues is a desirable treatment outcome such as cases with shallow vestibular depth and cases with inadequate gingival tissue where restorations with subgingival margins are to be placed.

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