

Periodontal Soft Tissue Non–Root Coverage Procedures: A Consensus Report From the AAP Regeneration Workshop

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Background: Soft tissue grafting for the purposes of increasing the width of keratinized tissue (KT) is an important aspect of periodontal treatment. A systematic review was analyzed, focusing on non-root coverage tissue grafts. The references were updated to reflect the current literature.

Methods: To formulate the consensus report, group members submitted any new literature related to the topic that met criteria fitting the systematic review, and this information was reviewed for inclusion in this report. A consensus report was developed to summarize the findings from the systematic review and to guide clinicians in their treatment decision-making process.

Results: Forty-six articles met the criteria for inclusion in the final analysis, and two articles were added that were used to formulate this consensus report. A list of eight clinically relevant questions was posed, and consensus statements were developed.

Conclusions: The evidence suggests that a minimum amount of KT is not needed to prevent attachment loss (AL) when optimal plaque control is present. However, if plaque control is suboptimal, a minimum of 2 mm of KT is needed. The standard procedure to predictably gain KT is the autogenous gingival graft. There is limited evidence for alternative treatment options. However, additional research may offer promising results in certain clinical scenarios.

Clinical Recommendations: Before patient treatment, the clinician should evaluate etiology, including the role of inflammation and various types of trauma that contribute to AL. The best outcome procedure (autograft) and alternative options should be reviewed with the patient during appropriate informed consent. Proper assessment of the outcome should be included during supportive periodontal care. *J Periodontol* 2015;86(Suppl.):S73-S76.

KEY WORDS

Gingival recession; periodontitis; regeneration; tissue engineering; tissue transplantation; surgery, plastic.

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Gingival augmentation procedures around natural teeth that are not aimed at achieving root coverage are performed to facilitate plaque control, to improve patient comfort, and to prevent future recession and are used in conjunction with restorative, orthodontic, or prosthetic dentistry. The aim of this consensus report is to summarize the findings of the systematic review and answer the most clinically relevant questions related to this treatment modality.

Although the clinical relevance of the recommendations of the workgroup for treatment alternatives will be addressed, autogenous tissue remains the gold standard for augmenting gingival tissues. It is clear that treatment alternatives to autogenous tissue are viable to avoid a palatal donor site, but these procedures require thorough patient informed consent, including the unknown long-term outcome of these less investigated alternative therapies. The quest of the profession for well-founded alternative therapies must be grounded with proper methods to capture patient-reported outcomes.

CLINICAL QUESTIONS

Is There a Need for a Minimum Amount of Keratinized Tissue (KT)?

The review of the literature suggests that, under optimal plaque-control conditions resulting in the absence of clinical inflammation, there is no need for a minimum amount of KT for preventing attachment loss (AL).

Which Clinical Scenarios Require a Minimum Amount of KT?

Prospective and retrospective studies have shown that, in the presence of suboptimal plaque control and clinical inflammation, AL and recession may result unless there is a minimum amount of KT. A minimum amount of 2 mm of KT with 1 mm of attached gingiva has been recommended under these circumstances. There are other clinical scenarios of traumatic etiology, such as the presence of subgingival restorative margins or clasps from removable appliances, specific orthodontic tooth movement, or anatomic situations in which the literature does not provide guidelines on the needed minimum amount of KT. There is a lack of evidence on the interplay between gingival inflammation and/or direct mechanical trauma (e.g., toothbrushing) in sites with minimum KT as the etiology of progressive recession.

How Relevant is the Recipient Site Periodontal Biotype?

There is a general assumption that individuals with a thin periodontal biotype, which will include not only soft tissue thickness but also bone thickness and tooth position, will be more prone to recession. Although there is consensus on the need for a minimum tissue thickness, there is no evidence defining this thickness.

In fact, a valid measurement of tissue thickness has not been developed. Specific techniques aimed at increasing tissue thickness have been proposed, including free gingival grafts (FGGs) and bilaminar approaches, but there is a lack of evidence on the long-term outcomes of these surgical interventions regarding tissue thickness.

Is There a Standard Procedure for KT Augmentation?

In situations in which gingival augmentation is indicated, autogenous gingival grafts have been considered to be the method of choice. The use of an FGG has been shown to predictably increase the width of KT. Considering that the average contraction of FGGs range from 25% to 40% in the vertical dimension, clinicians should plan for graft dimension accordingly. This surgical procedure may be limited by the donor site availability, which may also influence the frequency and severity of surgical complications. This procedure is mostly indicated in non-esthetic areas because blending with the surrounding tissues is usually inadequate. The reported KT augmentation ranges from 3.1 to 5.6 mm.¹

The free connective tissue graft (FCTG) has been proposed as an alternative to the FGG, although the amount of graft shrinkage is significantly higher (45% to 70%). FCTG blending with surrounding tissues is usually appropriate. The reported increase in KT from this one study following graft shrinkage was 5.25 mm.¹

How Relevant is Graft Thickness?

Because the thickness of the palatal epithelium ranges from 0.1 to 0.6 mm, the minimum thickness of a gingival graft should range from 0.75 to 1.25 mm to ensure that the graft will have an adequate amount of connective tissue to allow for graft survival.¹ Thick grafts will have more primary contraction but less secondary shrinkage and less blending with adjacent tissues. In general, the majority of the shrinkage will occur during the first postoperative year and will become stable thereafter.

What are the Alternatives to Autogenous Graft Tissue for Gingival Augmentation Procedures?

In recent years, alternative graft techniques and biomaterials have been introduced with the purpose of avoiding donor site morbidity and to overcome limited availability of autogenous tissue. The scientific evidence on the efficacy of these alternative techniques is limited and mainly consists of few studies with short-term reported outcomes (<1 year). The alternative procedures with published evidence include the following:

- 1) The modified apically repositioned flap surgical procedure does not involve the placement of a graft but requires apically positioning a portion of the gingival tissues. This flap modification has shown promising

outcomes (average gain in width of KT of 2 mm), but these results come from one study (6 months) and have not been reproduced.¹

2) For acellular dermal matrix, the use of allogeneic grafts for KT gingival augmentation have shown heterogeneous results, with limited gains in the width of KT. The esthetic outcome of this procedure has also been reported as compromised with the appearance of scar tissue formation, which has been confirmed histologically.

3) Extracellular matrix membrane is a xenogenic extracellular matrix of porcine origin. Its use as grafting material for gingival augmentation has been tested in one clinical study with a limited number of patients. The mean gain in KT was 2.6 mm.¹

4) Bilayer collagen matrix is a xenogenic Type I and III collagen tissue of porcine origin. Its use as grafting material for gingival augmentation around teeth has been tested in three randomized clinical trials (RCTs) that reported an average gain in KT of 2.5 mm. In two studies, patient-reported outcomes were analyzed compared with control treatment using autogenous grafts demonstrating significant pain reduction, less analgesic drug consumption, and better patient acceptance.^{1,2}

5) Living cellular construct is a bioengineered construct composed of living allogeneic human fibroblasts and keratinocytes, bovine collagen, and human extracellular proteins. Its use as a grafting material for gingival augmentation around teeth has been tested in two RCTs and one case series that reported average gains in KT ranging from 1.3 to 1.8 mm.^{1,2}

SPECIAL CLINICAL SCENARIOS

Restorative subgingival margins have been associated with greater plaque accumulation, inflammation, and gingival recession. When these subgingival margins affect areas of minimal amounts of KT, there might be a higher risk for gingival recession. In fact, some studies have reported that subgingival margin placement has led to early gingival recession and AL despite careful maintenance therapy, and gingival recession was more likely to occur at these sites. There is enough clinical evidence from classic literature to support maintaining an adequate band of gingiva for restorations with intracrevicular margins.

The relation between orthodontic treatment and its effect on periodontal health has been controversial. Several authors have demonstrated that gingival recession may develop during or after the orthodontic therapy involving teeth that have an inadequate zone of gingiva, although this outcome is fully dependent on the nature and direction of the orthodontic movement.³ Thus, it has been recommended that areas with <2 mm of KT should undergo gingival augmentation before the initiation of orthodontic therapy if the

foreseen movements would move the tooth out of the bony envelope. However, to the best of the author's knowledge, there are no prospective controlled longitudinal studies investigating the effect of orthodontic therapy on the width (apico-coronal dimension) of KT.

Wennström⁴ summarized the following: 1) orthodontic tooth movement does not cause gingival recession as long as teeth are moved within the alveolar housing; 2) the thin gingiva as a consequence of the facial tooth movement may allow soft tissue defects in the presence of bacterial plaque and/or trauma caused by improper brushing technique; 3) before initiation of orthodontic therapy, the bucco-lingual thickness of the soft tissue on the pressure side of the tooth should be evaluated; and 4) proper plaque control should be initiated before, during, and after the completion of the orthodontic therapy.

There are certain clinical situations, such as the presence of amalgam tattoos, melanin hyperpigmentation, previous surgical trauma, and the surgical re-establishment of the mucogingival junction, in which gingival grafts (non-root coverage) have been recommended, and good outcomes have been reported in case reports.^{5,6}

EFFECT ON PATIENT-REPORTED OUTCOMES

Most studies evaluating these interventions did not consider patient-reported outcomes as part of the overall treatment assessment. It is recommended that the assessment of the patient's post-surgical pain and discomfort, esthetic outcome, patient satisfaction, and overall cost effectiveness should always be included when developing study protocols and assessing the results.

For the evaluation of the patient's post-surgical pain and discomfort, the use of validated indices with real-time third-party assessment (e.g., visual analog scale) and patient interviews together with objective evaluations of analgesic drug consumption are recommended.

For the evaluation of the esthetic outcome, the use of validated indices and patient questionnaires that include not only color but also tissue texture and blending with adjacent tissues is recommended.

For patient satisfaction, this evaluation should take into account the patient's anxiety before, during, and after the procedure. In addition, the willingness of the patient to try innovative procedures and/or the need for additional surgical sites should be considered.

A recently published RCT developed and used the patient-reported outcomes methodology to better understand the challenges and important tasks to be accomplished when obtaining patient-reported outcomes in mucogingival surgery.² A commentary by the authors is available to guide researchers who conduct periodontal research.⁷

FUTURE RESEARCH

The following are aims for future research: 1) to identify the critical patient-specific etiologic factors of AL in sites with a minimum amount of KT and to identify the role of inflammation and/or trauma in the AL process; 2) to incorporate patient-reported outcomes into all clinical research to gain unbiased feedback regarding all aspects of treatment; 3) to determine the long-term stability of both standard and alternative procedures; 4) to identify the importance of tissue thickness and biotype versus the width of KT (it is important to develop and use validated measures of assessing tissue thickness, volume, and biotype); 5) to further develop and evaluate alternative therapies and their efficacy, which should include long-term stability; and 6) to further explore the critical dimension of KT necessary in various clinical scenarios.

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