

The influence of tobacco smoking on the outcomes achieved by root-coverage procedures

A systematic review

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Frequently, the oral exposure of the root surface due to a displacement of the gingival margin apical to the cemento-enamel junction (that is, gingival recession) leads to tactile and thermal dental hypersensitivity, root abrasion and deterioration in the smile's esthetics.¹ In such conditions, periodontal treatment itself is designed to stop the progression of recession and to re-establish a condition of health, function and esthetics through the use of clinically predictable procedures.

With respect to the coverage of denuded root surfaces, researchers in several trials have described attempts to treat recession-type defects through the use of diverse surgical techniques such as laterally repositioned flaps,²⁻⁴ coronally advanced flaps,^{5,6} free gingival grafts,^{7,8} subepithelial connective-tissue grafts,^{1,9-13} acellular dermal matrix allografts^{14,15} and guided tissue regeneration.¹⁶⁻¹⁹ These periodontal plastic surgery procedures are indicated¹⁻¹⁹ for the treatment of Miller²⁰ Class I and Class II recessions. Additionally, investigators in systematic reviews evaluating different periodontal plastic surgery procedures have demonstrated that such techniques are effective in reducing the extent of exposed root surface, with a concomitant gain in clinical attachment level (CAL)²¹⁻²⁴ and in the width of keratinized tissue (KT).^{21,22} On the other hand, it

ABSTRACT

Background. The authors conducted a systematic review to evaluate the effect of smoking on the clinical outcomes achieved by periodontal plastic surgery procedures in the treatment of recession-type defects.

Types of Studies Reviewed. The authors performed an electronic search on MEDLINE, EMBASE and the Cochrane Central Register of Controlled Trials (CENTRAL) for randomized controlled clinical trials, controlled clinical trials and case series that involved at least six months' follow-up. They looked for studies published through June 2008 that compared the outcome measures achieved by smokers and nonsmokers after they underwent periodontal plastic surgery procedures for treatment of gingival recession.

Results. From a total of 632 references, the authors considered seven studies to be relevant. The meta-analysis indicated a statistically significant greater reduction in gingival recession ($P < .001$) and gain in clinical attachment level ($P < .001$) for nonsmokers when compared with smokers whose gingival recession was treated with subepithelial connective-tissue grafts. Additionally, nonsmokers exhibited significantly more sites with complete root coverage than did smokers ($P = .001$). For coronally advanced flaps, differences between the groups were not significant.

Clinical Implications. The results of this review show that smoking may negatively influence gingival recession reduction and clinical attachment level gain. Additionally, smokers may exhibit fewer sites with complete root coverage.

Key Words. Gingival recession; gingival recession/surgery; root coverage; systematic review; smoking.

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is difficult to predict accurately an individual tooth's clinical response to treatment over time, especially if the patient is exposed to one or more risk factors known to influence host response.^{25,26}

With respect to tobacco smoking, evidence is building that smoking may negatively affect the results achieved through periodontal plastic surgery procedures. Tobacco smoking is a recognized risk factor that affects the oral environment and ecology, vascularization of the gingival tissues, immune and inflammatory responses and the healing potential of the periodontal connective tissues.²⁷ Smokers are two to eight times more susceptible to periodontal disease than are nonsmokers.²⁸ Moreover, researchers have identified tobacco smoking as producing a negative effect on periodontal therapy, nonsurgical and surgical alike.²⁹⁻³¹ Moreover, smokers are more susceptible to needing periodontally related tooth extractions during maintenance care after undergoing periodontal treatment.^{25,26}

Even though previous systematic reviews²¹⁻²⁴ provided some information of interest about smoking, the majority of trials included in these reviews did not include smokers, and the authors of these reviews did not delineate inclusion criteria in such a way as to warrant inclusion of all studies that have estimated the impact of smoking on clinical outcome measures.²¹⁻²⁴ To date, to our knowledge, no investigators have designed a systematic review that compares the effect of treatment of gingival recession in smokers and nonsmokers. Therefore, our objective in performing a systematic review was to evaluate the effect of tobacco smoking on clinical outcomes achieved by periodontal plastic surgery procedures in the treatment of recession-type defects. The research question on which we focused for this systematic review was "Does tobacco smoking influence the outcome measures achieved by root-coverage procedures?"

MATERIALS AND METHODS

Study selection, inclusion criteria and types of interventions. We undertook a systematic review of randomized controlled clinical trials, controlled clinical trials and case series with a follow-up period of at least six months. Owing to the limited number of randomized controlled clinical trials available in previous reviews—that is, trials comparing data from smokers and nonsmokers²¹⁻²⁴—as well as the impossibility of randomization in studies in which only one surgical

procedure was tested, we included all levels of evidence in the review. We considered studies for inclusion if they involved the following:

- recession areas selected for treatment classified as Miller²⁰ Class I or II that were treated surgically by means of periodontal plastic surgery procedures (such as acellular dermal matrix allografts, coronally advanced flaps, free gingival grafts, guided tissue regeneration and subepithelial connective-tissue grafts);
- outcome measures from smokers and nonsmokers, recorded separately;
- subjects 18 years or older.

In addition, we considered subjects to be smokers if they smoked 10 cigarettes or more per day at the time of the baseline examination.

Outcome measures. Outcome measures were reported in terms of changes from baseline to each follow-up period. The following outcome measures were reported:

- change in gingival recession (GR);
- change in CAL;
- change in KT;
- percentage of sites exhibiting complete root coverage;
- mean root coverage.

Search strategy. To streamline the identification of studies included in or considered for this review, we developed detailed search strategies for each database we searched that were based on the strategy described below for searching the Cochrane Central Register of Controlled Trials (CENTRAL). We adopted a similar search strategy as reported by a recent Cochrane review regarding the effectiveness of different root-coverage procedures in the treatment of recession-type defects.²² We searched databases for articles published through June 2008, including papers and abstracts published in English-language journals. We searched MEDLINE, EMBASE, CENTRAL and the Cochrane Oral Health Group's Specialized Register databases. The search strategy we applied was as follows: (gingival recession OR ((recession NEAR gingiva*))

ABBREVIATION KEY. **CAF:** Coronally advanced flap. **CAL:** Clinical attachment level. **CENTRAL:** Cochrane Central Register of Controlled Trials. **GR:** Gingival recession. **KT:** Keratinized tissue. **MRC:** Mean root coverage. **NR:** Not reported. **PCRC:** Percentage of complete root coverage. **SCRC:** Sites exhibiting complete root coverage. **SCTG:** Subepithelial connective-tissue graft.

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