

CERVICAL MARGIN RELOCATION - BASIC PRINCIPLES AND INFLUENCE ON THE PERIODONTAL TISSUES

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ABSTRACT

INTRODUCTION: Cervical margin relocation (CMR) involves the placement of a base layer of direct resin composite material in order to elevate the proximal cavity margins located below the gingiva. CMR is applied prior to the cementation of indirect bonded restorations.

AIM: The aim of this review is to briefly present the basic principles of the CMR technique and to assess whether the execution of this method before the cementation of indirect bonded restorations is beneficial to the long-term outcome of the treatment and to the periodontal tissues according to the literature.

MATERIALS AND METHODS: This review includes articles searched without date restriction in the Medline/PubMed database along with bibliographic data. A variety of keywords and their combinations were used: “cervical margin relocation”, “proximal box elevation”, “indirect restorations”, “adhesion”, “marginal adaptation”, “marginal sealing”, “deep margin elevation”.

RESULTS: The review is based upon 41 references. The literature data provided information on the basic principles of cervical margin relocation and its relation to periodontal health.

CONCLUSION: Further research, scientific evidence and longer follow-up results are needed in order to conclude that CMR is entirely beneficial to the long-term outcome of the treatment and to the periodontal tissues.

Keywords: *cervical margin relocation, proximal box elevation, indirect restorations*

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INTRODUCTION

Large proximal caries defects on posterior teeth represent a frequent clinical encounter. The defect may extend below the cemento-enamel junction, leaving the cavity margins subgingivally. In order to elevate the margins supragingivally the cervical margin relocation (CMR) technique is applied before the cementation of indirect bonded restorations (1,2).

CMR involves the placement of a base layer of direct resin composite material in order to elevate the proximal cavity margins located below the gingival tissues. The concept of CMR was first introduced in 1998 by Dietschi and Spreafico (1). Since then, this approach has attracted the attention of clinicians as an attempt to simplify the isolation and adhesion protocol of indirect bonded restorations in cases involving class II interproximal defects with subgingival cavity margins. Certain synonyms of the term CMR can be found in the literature. Techniques such as proximal box elevation and deep margin elevation (2) refer to the same concept.

AIM

The objective of this literature review is to present the basic principles of the CMR technique and its effect on the periodontal tissues. It also aims to assess whether the execution of this method before the cementation of indirect bonded restorations is beneficial to the long-term outcome of the treatment.

MATERIALS AND METHODS

This literature review includes scientific articles and bibliographic data. Articles searched without date restriction in the Medline/PubMed database were taken into account. A variety of keywords and their combinations were used: “cervical margin relocation”, “proximal box elevation”, “indirect restorations”, “adhesion”, “marginal adaptation”, “marginal sealing”, “deep margin elevation”. Information only in English was taken into consideration.

RESULTS

The review is based upon 41 references. The literature data provided information on the basic principles of cervical margin relocation (CMR) and its relation to periodontal health.

Basic Principles of Cervical Margin Relocation (CMR)

Cervical margin relocation (CMR) is considered as a non-invasive solution aiming to avoid surgical crown lengthening and orthodontic extrusion when it is possible. CMR can be performed using different kinds of adhesive systems and composites (2–6) and a metal or clear interproximal matrix (2,7). The composite resin material is layered with the intention to elevate the cervical margin supragingival-

ly. This way the conditions for impression taking or intraoral optical scanning, proper adhesion of the bonded indirect restorations, and precise finishing and polishing of the margins are improved (2,8).

Rubber dam isolation is mandatory regardless of being rather complex in cases of very deep subgingival margins in order to establish better visibility, moisture control and to avoid contamination of the working field (9,10,11). Contrary to this principle, a case report by Kielbassa and Philipp (5) demonstrated a clinical protocol without the use of a rubber dam. They used saliva ejectors and cotton rolls instead (5).

It has been well studied that adhesive bonding to etched enamel is considerably stronger and more sustainable than the adhesion to dentin and cementum (12,13). It should be considered that in case of a deep subgingival defect, often the only substances present are dentin and cementum and this will certainly have an impact on the marginal sealing properties (14). Additionally, if enamel is present, it is in a very thin layer. The majority of the literature sources taken into consideration conclude that CMR should be executed using a 3-step total-etch adhesive system. (2,5,6). Another approach suggests the use of a 2-step self-etch adhesive system, which skips selective etching of the enamel (5,6). As far as the different types of composite materials used for CMR are concerned, traditional viscous resin composites and flowable resin composites can be applied, or a combination of them (2,5,7). Additionally, highly filled flowable composite materials or bulk fill flowable composite materials are quite suitable for the execution of the technique (6,15).

Köken S et al. (16) explored the effect of the CMR technique on marginal sealing. The team used two types of resin composite materials with different viscosity prior to the cementation of composite CAD/CAM mesio-occluso-distal (MOD) overlays. The dentin-CMR composite interface leakage score did not notably differ between the two composite materials included in the study, but was remarkably lower in the cases, where CMR was not used. More pronounced leakage was registered at the dentin interface than at the enamel interface in all of the cases (16).

The porosity of the composite resin material is an important factor in relation to the plaque accumulation and longevity of the restoration. The inclusion of air in the composite material during the clinical application has a negative effect on its qualities and leads to the formation of defects in it (17). These defects can cause fractures inside the composite material, which results in reduction of the resistance to flexion, traction, wear, and compression. Furthermore, the so formed fractures may accelerate the diffusion of water molecules inside the composite material (18–23).

Before taking the impression for the indirect adhesive restoration or intraoral optical scanning, the applied resin composite used to elevate the deep cervical margin should be thoroughly shaped and polished with diamond burs and a variety of polishing devices such as discs, brushes, etc. (2,5,6).

Bresser et al. (24) conducted a clinical evaluation of 197 partial indirect restorations with deep margin elevation (DME) in the posterior region for a time period of up to 12 years. As stated above in this review article, DME and CMR are synonyms and represent the same concept. The research team made a conclusion that indirect restorations with DME (CMR) have a satisfactory clinical outcome, but longer follow-up is required because of the deterioration of the restorations in time (24).

The CMR technique aims to get a better control of the margins of indirect restoration during preparation, impression taking, and luting (1,25), but cannot enhance the quality of bonding to cementum and dentin (26,27). Moreover, the continuous decay of the hybrid layer at the bonding interface cannot be evaded (28,29).

Periodontal Tissues and Cervical Margin Relocation (CMR)

There is an undoubtful correlation between the successful dental restoration and good periodontal health (30). Subgingivally located margins inevitably affect the periodontal tissues (31). The biologic width around the tooth planned to be restored should be carefully taken into consideration in order not to be harmfully affected. A distance of at least 3 mm between the restorative margins and the alveolar crest is needed so that damaging consequences for the periodontium are avoided (32,33). Absence of

bleeding on probing (BoP) and probing pocket depth (PPD) less than 4 mm are major indicators for good periodontal health (34).

Marco Ferrari et al. (35) carried out a scientific research on the influence of the CMR technique on periodontal health, followed by 12-month results of a controlled trial. The main conclusion from the conducted scientific study was that higher BoP occurrence can be anticipated around teeth on which the CMR technique was performed and in coincidence with deep margins placed at/or closer than 2 mm from the bone crest (35).

After the CMR technique is applied, the margins of the indirect restoration are elevated above the gingival tissues, but the margin between the tooth and the composite material used for the technique is still located subgingivally. This may serve as a prerequisite for gingivitis, periodontal attachment loss, and bone resorption (36). Research-based evidence demonstrates that there is a correlation between margins located below the gingiva and increased bleeding on probing incidence (36–39).

DISCUSSION

CMR can be applied when Class II interproximal defects with subgingival cavity margins, which are bound to be treated with indirect adhesive restorations, are present (1,2,40,41). The biologic width around the tooth planned to be restored should be carefully taken into consideration in order not to be harmfully affected (32,33). However, the evidence supporting the application of the technique is insufficient to draw a conclusion about its entirely positive effect (3,5,16,24,35).

CONCLUSION

Taking everything into consideration, it can be concluded that further research, scientific evidence and longer follow-up are needed in order to implicate that CMR is entirely beneficial to the long-term outcome of the treatment and to the periodontal tissues and can represent the alternative to surgical crown lengthening or orthodontic extrusion if there is no compliance with the biologic width.

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