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## Deep margin elevation, State of the art and future directions

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### Abstract

**Introduction:** Deep margin elevation is a technique that allows reestablishing the location of restorative margins to a coronal position, without the need for surgery using adhesive materials.

**Objective:** To review the literature on the deep margin elevation technique, materials used, advantages compared to crown lengthening and limitations.

**Methodology:** A review was carried out in the databases Scopus, PubMed and Google scholar with the keywords "DME", "deep margin", "margin repositioning", "cervical margin repositioning", "subgingival margin".

**Results:** The correct isolation, placement of matrices, adhesive technique and polishing are the basis of this technique; and in turn are facilitated using magnification. The most used materials are resin-based, the ideal adhesives are 2-step self-etching and although traditional composite resins are the most used, high-loading fluids show promising results. The absence of a recovery period and the fact that there is no affection of the periodontium if properly executed are its main advantages. Although this technique simplifies the restorative process, it is important to be aware of limitations such as a minimum distance of 2mm from the crest for its execution, the possibility of isolating and placing matrix, as well as the use of high quality materials.

**Conclusion:** Knowing and respecting the limitations of this technique, it is possible to manage lesions that before its adoption required surgical management without the need for a healing period and the option to take the impression or rehabilitate immediately.

**Keywords:** DME, deep margin, cervical repositioning, subgingival margin, subgingival margin

### 1. Introduction

Deep marginal elevation allows the repositioning of sub gingival margins to a more favorable position without the need for crown lengthening surgery and its related implications such as bone loss, black triangles, papilla atrophy<sup>[1]</sup>.

An adequate relationship between restorations and gingival health are vital for a continued and optimal oral health after rehabilitation<sup>[2]</sup>.

The presence of sub gingival restorations can lead to bleeding on probing, increased probing depth and loss of clinical attachment, as well as a risk of gingival recession when taking sub gingival impressions due to a greater need for retraction<sup>[3,4]</sup>.

It has been found that restorations with supragingival margins provide better periodontal health and ease of hygiene<sup>[5]</sup>, so when a margin is subgingivally located, a relocation that allows a more favorable position will be the ideal. Coronary lengthening surgery is a highly studied and predictable procedure, but it has the disadvantage of bone loss, possibility of posterior gingival margin displacement, papillae with poor esthetics and possible presence of black triangles; therefore, marginal elevation is a reliable, conservative, and predictable alternative<sup>[6]</sup>.

Margin elevation is a procedure in which the repositioning of the margin of an indirect restoration is achieved by using adhesive materials and an adequate absolute isolation<sup>[7]</sup>.

This technique is useful for indirect restorations with analog and digital impression; as well as for greater ease and predictability of direct restorations<sup>[8]</sup>.

The marginal elevation technique allows coronal repositioning of the restorative margins without the need for a surgical procedure with the recovery time that this entails, as well as the disadvantages and risks associated with this procedure. In this work, a review of the literature on the deep margin elevation technique, the materials used, and its advantages and limitations were carried out.

## 2. Materials and methods

Information from articles published in PubMed, SCOPUS and Google Scholar was analyzed with emphasis on the last 5 years. The quality of the articles was evaluated based on the standard guidelines, i.e., identification, review, choice, and inclusion. The quality of the review was assessed using the measurement instrument for evaluating systemic reviews. The search was performed using Boolean logical operators AND, OR and NOT. It was realized with the words "deep margin elevation", along with the following terms: "Materials", "Methods", "Future" and "Limitations", also in conjunction with logical Boolean operators OR y AND.

## 3. Results & Discussion

### 3.1 Deep margin elevation technique

The basis of margin elevation is the use of direct composites in conjunction with absolute isolation with rubber dam and metal matrices to reposition the margin, in addition to an adequate management of the techniques and adhesive materials<sup>[9]</sup>, which makes it a demanding technique, but the advantages related to the absence of a post-surgical period and the possible complications of a crown lengthening make this technique to be considered as a first option<sup>[1]</sup> in deep lesions, allowing a faster restoration of a greater number of cases<sup>[10]</sup>.

To perform this technique properly, it is essential to locate the floor of the lesion whose margin is to be relocated with respect to the bone crest, both with radiographs and adequate probing, since if the connective tissue of the biological thickness is invaded or if it is too close to the bone crest, success cannot be guaranteed<sup>[11]</sup>.

Once the rubber dam isolation has been adequately placed and the carious lesion has been completely removed, the matrix should be placed in such a way that it is in intimate contact with the margins of the cavity, without interference of gingival tissue, dam, or any other material coronally with an adequate anatomical adaptation without under or over-contouring<sup>[8]</sup>, as well as improving the geometry of the cavity for an easy subsequent restoration<sup>[12]</sup>. The use of magnification is widely documented as an adjuvant in the correct execution of restorative procedures, and its use can lead to better marginal elevation results<sup>[13]</sup>.

Although the use of adhesives with a high filler load is preferred, adhesives with thin films can be used simultaneously with flowable resins that protect the hybrid layer<sup>[14]</sup>. Once the adhesive protocol has been performed, sufficient resin should be placed to relocate the margin coronally, and it should be properly polished to avoid adhesion of dentobacterial plaque<sup>[15]</sup>.

The correct use of isolation, matrix placement, adhesive technique and polishing are the basis of this technique; and in turn these are facilitated by using magnification.

### 3.2 Materials used

The materials used for the marginal elevation technique must provide an adequate interface with the tooth to be restored to ensure a correct and lasting seal. Resin-based materials are ideal for this task, which does not mean that other materials have not been studied for this application, such as vitreous ionomer; although the results show a clear advantage of resin materials in critical aspects such as marginal micro leakage rates<sup>[16-18]</sup>.

Regarding the ideal adhesive systems to perform marginal elevation, it has been found that those of the 6th generation (2-component self-adhesives) provide the best results in terms of bond strength and micro leakage<sup>[19]</sup>; although those of the 4th generation (2-component total etch) provide excellent clinical results, they have the difficulty that under- or over-etch on dentin can compromise the adhesive interface. Universal adhesives can be used for this technique if they are used in self-etching mode on dentin<sup>[20]</sup>, although the use of a double layer of dentin is recommended<sup>[21]</sup>. The use of fluid resin as a liner is not as influential as an adequate technique or correct light curing<sup>[22, 23]</sup>.

Composite resins are the most used and recommended material for the elevation itself, preheating is recommended to facilitate its handling and improve its adaptation<sup>[8]</sup>. There are in vitro studies that support the use of fluid resin with high load, although more clinical evidence is still needed to recommend its use<sup>[24]</sup>.

The most widely used and studied materials are resin-based, the ideal adhesives are 2-step self-etching and although traditional composite resins are the most widely used, high-loaded flow able resins show promising results.

### 3.3 Advantages compared to crown lengthening

One of the main advantages of this technique against crown lengthening is the fact that there is no post-surgical period within which the definitive impression cannot be made<sup>[6, 25, 26]</sup> for a period of at least 3 months or until stability of the gingival margin is achieved in the esthetic area<sup>[27]</sup> or at least 4 weeks in the posterior sector if there is no esthetic compromise<sup>[28]</sup>; as well as a repositioning of the gingival margin<sup>[29, 30]</sup> possible involvement of the papilla and loss of bone tissue among other considerations<sup>[31]</sup>.

The absence of a recovery period and the possibility are the most attractive advantages of the procedure; it should also be mentioned that there is no involvement of the periodontium if it is performed properly.

### 3.4 Limitations of the technique

One of the main limitations of this technique is when the floor of the cavity is located within the connective tissue or too close to the osseous crest, a distance greater than 2 mm being necessary to perform the elevation<sup>[28]</sup>.

The impossibility of performing a correct light curing<sup>[32]</sup>, achieving an adequate isolation of the operative field, or ideal placement of matrices that allow a correct contouring of the reconstruction will also be a contraindication for the execution of this restorative technique<sup>[8, 13]</sup>. It should also be noted that this procedure is highly sensitive to technique (type of adhesive, restoration, and incremental layering of the restoration), and it is necessary to verify with radiographs an adequate contouring and polishing to avoid periodontal damage or possible filtrations of the restoration<sup>[33, 34]</sup>.

Among other necessary aspects to evaluate prior to the execution of a marginal elevation is the use of high quality materials which can prevent leaks in the short term compared

to low quality materials<sup>[35]</sup>.

Although this technique simplifies the restorative process, it is important to be aware of limitations such as a minimum distance of 2mm from the ridge for its execution, the possibility of isolating and placing matrix, as well as the use of high quality materials.

### Conclusions

Knowing and respecting the limitations of this technique, it is possible to manage lesions that before its adoption required surgical management without the need for a healing period and the option to take the impression or rehabilitate immediately. It is essential to use impeccable isolation, matrix placement, adhesion, and polishing protocols for long-term predictability.

### Conflict of Interest

Not available

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