

## Case Report

# Advancing Dentistry: Exploring Deep Margin Elevation in Post-Endodontic Buildup of a Mandibular Molar

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### Abstract

Clinically treating subgingival deep carious lesions might be difficult because of the difficulties in obtaining adequate accessibility and a dry environment for proper bonding. Conventional restorative and surgical methods are invasive. Using contemporary restorative resources and methods, the deep margin elevation technique has developed into an easy and practical way to handle otherwise challenging cases. The sequential process for deep margin elevation has been outlined using a clinical example that has been stated with focus on isolation as the key to success.

**Key words:** Bioclear, Deep margin elevation, Snow-plow technique

### Introduction

In the realm of modern dentistry, preserving tooth structure while ensuring optimal restoration is paramount. The dental clinician has been consistently challenged by restoration of deep proximal lesions since they are usually associated with significant defects with subgingival margins exceeding cemento-enamel junction. Mandibular molars, owing to their complex anatomy and functional demands, often require endodontic treatment followed by a buildup procedure for long-term success. However, achieving ideal marginal adaptation in these cases can be challenging. Deep margin elevation emerges as a promising technique to address this challenge, enhancing the longevity and functionality of post-endodontic restorations. Advances in the material science, adhesive systems and improved isolation techniques have greatly expanded the clinical use and applications of restorative materials.<sup>(1)</sup>

With the help of minimally invasive techniques, even extensive and

undermining defects can be restored, thereby preserving the sound tooth structure and providing long-lasting durability to the tooth.<sup>(2)</sup>

One of the most common yet challenging experiences faced in daily practice are, achieving durable restorations in the moist deep subgingival areas of Class 2 and Class 5 cavities because of difficulty in obtaining a well isolated operatory field, weaker bond strengths in cervical areas, difficulty in recording a proper impression and providing good contact and contours especially in restorations beyond the cemento-enamel-junction.<sup>(3)</sup> However, recently it has been shown that if moisture control is possible, these problems can also be overcome using newer materials alongside modified techniques even in deeper cavities.<sup>(4)</sup>

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DOI: <https://doi.org/10.5281/zenodo.11000944>

**How to cite this article:** Nagpal R et al.: Advancing Dentistry: Exploring Deep Margin Elevation in Post-Endodontic Buildup of a Mandibular Molar, *HTAJOCD.2024; March-April(4):46-49.*

**Dietschi and Spreafico**, in 1998, suggested that instead of surgically lengthening the crown or extruding the tooth which can be both time consuming as well as invasive, rather elevate the existing proximal margin, from a subgingival cavity to a more supragingival level by the use of an adequate layer of composite along with an appropriate isolation method.<sup>(5)</sup>

**Ghezzi et al.**, describe the deep margin elevation technique, as a more minimally invasive procedure that is both biologically sound and operatively friendly. This technique was previously also known as open sandwich technique, cervical margin relocation (CMR) and proximal box elevation.<sup>(2)</sup>

To achieve adequate bonding during deep margin elevation the protocol that needs to be followed starts with assessing the extent of the carious lesion, its proximity to the pulp, evaluating the distance of the future therapeutic margin from the bone crest, isolating the working field, removing the carious defect, placement an appropriate matrix to achieve a good emergence profile and contacts, immediate dentin sealing (IDS) for optimal seal and adhesion, elevating the margin, providing final polymerization through glycerin gel to eliminate oxygen inhibition layer (OIL) otherwise the impression material interacts with the bond and causes inaccurate impressions, finishing and polishing the restoration and then taking postoperative bitewing radiographs to assess proper contacts.<sup>(1)</sup>

This article aims to shed light on this new conservative DME approach by presenting the findings of a clinical case and challenging the biologic width orthodoxy.

## Materials and Method

**Case:** A 39-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in her left mandibular back tooth region since the past 1 year. Clinical examination revealed that the patient had initiated RCT with respect to mandibular left first molar six months back from another dentist. Radiographic examination confirmed deep disto-proximal radiolucency approaching the pulp chamber which extended subgingivally with periapical radiolucency associated with the mesial root making post-endodontic restoration challenging (Figure 1).

It was determined to be 1 mm below the marginal gingiva and suitable for DME. The tooth was non-vital and tender to percussion. Finally, a treatment plan of non-surgical root canal treatment followed by post-endodontic restoration with deep margin elevation was planned. The tooth was anaesthetized using 2% lidocaine with 1:200,000 epinephrine followed by isolation using rubber dam (Coltene). Gingivectomy was carried out using a no. 15 blade to expose the distal orifice and haemostasis was obtained using Viscostathæmstatic agent (Figure 2A and 2B). The access cavity was refined using Endo Z bur (Densply Sirona) in a triangular shape and all 3 canals were negotiated. The working length was determined using apex locator (Woodpecker V Apex locator, Unicorn Denmart) and later confirmed by radiographs and the traditional root canal treatment was carried out (Figure 2C and 2D). A Bioclear posterior pre contoured plastic matrix (Bioclear matrix systems, South Warner St Tacoma, WA) was used to achieve proper contact and contour. U-shaped sectional metal matrix band (TOR VM, Moscow) was used along with the Bioclear matrix and placed vertically sub-gingivally to cover the deep cervical defect and to achieve a good emergence profile (Figure 2E) and the whole assembly was secure using plastic wedges. The cavity was then etched using 35% phosphoric acid (Prime dental, India) (Figure 2F) and a universal bonding agent (Single bond universal adhesive, 3M, ESPE, USA) was applied and light cured for 20 seconds (Figure 2G). Margins were elevated using the “Snowplow Technique” which involves the placement of a thin layer of uncured flowable composite on the gingival margin of the proximal box, and the injection of composite paste in bulk over the flowable composite. This technique is supposed to push the flowable composite toward the cavity walls allowing a homogeneous restoration reducing voids. Injection moulding was done using a flowable resin and nanofilled composite material (3M Filtek Z350 XT Universal Restorative) (Figure 2H and 2I). The restoration was finished and polished, post-operative radiograph was taken (Figure 2J and 2K) and the patient was recalled 3 months.

The gingiva was healthy, the restoration was intact and the periapical lesion had resolved (Figure 3).



Figure 1

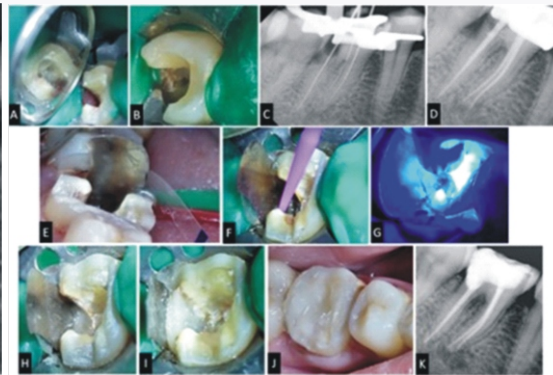


Figure 2



Figure 3

### Discussion:

The management of subgingival lesions or defects invading the biologic width pose a clinical challenge and are managed by surgical crown lengthening or orthodontic extrusion procedures. Recent advances in adhesive technology, material science and isolation techniques have made possible the conservative deep margin elevation approach.

The DME approach is suitable for a wide range of clinical situations, where the subgingival defects are limited to the junctional epithelium and has not invaded the connective tissue attachment.<sup>(1)</sup> As stated by Ghezzi et al. the ability to clinically isolate the subgingival lesion under a rubber dam should guide the choice of treatment procedure rather than the rigid concept of geometric biology.

**Type I category:** deep cases isolatable without gingival soft tissue management

**Type II category:** cases limited in depth to the epithelial component and isolatable clinically by gingivectomy or raising a flap

**Type III category:** cases involving the connective tissue component necessitating the classic crown lengthening osteotomy approach.<sup>(6)</sup>

Biological width should not be violated, and good oral hygiene should be followed. Otherwise, it could lead to an inflammatory response from the periodontium due to microbial biofilm on restorations placed in deep areas.

- Ingber et al. suggested a minimum of 3 mm from the restorative margin to the alveolar crest.<sup>(7)</sup>
- Nevins and Skurow recommended limiting the extension of the subgingival margin to 0.5 to 1.0 mm, respecting the 3 mm of space from the bone crest to the crown margin.<sup>(8)</sup>

- Wagenberget al. considered 5 mm to be a suitable distance from the bone to the restorative margin.<sup>(9)</sup>

According to a clinical study in humans, DME and subgingival restorations are compatible with periodontal health given that they are well-polished and refined. Several materials have been used (microhybrid, nanohybrid, bulk-filled composites, siloranes, ormocers, self-adhesive resin cements, glass ionomers, resin-modified glass ionomers) at different viscosities (condensable, flowable, preheated) in one or more layers. However, researchers have no consensus regarding the material of choice for DME.<sup>(10,11)</sup>

Some studies demonstrated the comparable performance of flowable and micro-hybrid composites when used for DME.<sup>(12)</sup> Scotti et al. yielded that, at baseline, flowable composites provide adequate or even better marginal seal than nanohybrid and bulk-filled composites.<sup>(13)</sup> According to Zavattini et al. preheated composites are preferable.<sup>(14)</sup> In general, glass ionomers, resin-modified glass ionomers, resin-based composites, and bulk-filled composites are acceptable materials for DME since, so far, they do not seem to influence marginal quality. The incremental technique used in DME may positively influence marginal integrity; when using condensable composites, careful layering (3 layers) exhibits fewer gaps than no layering (1 layer). DME does not lead to BW recreation but a healthy variable, comprised of a longer junctional epithelium alongside the material and a smaller connective attachment along the dentin underneath the composite.<sup>(15)</sup>

<sup>(16)</sup> Nevertheless, it provides an expeditious and convenient clinical technique eliminating the need for surgical, invasive or other long-term procedures. Further clinical studies to determine the long-term performance of this treatment approach should be encouraged.

## Conclusion:

In the realm of post-endodontic buildup, achieving optimal marginal adaptation is crucial for long-term success. Deep margin elevation offers a valuable technique to address the challenges associated with restoring mandibular molars. By creating space at the preparation margin and facilitating better adaptation of restorative materials, this technique enhances the longevity and functionality of post-endodontic restorations. As dentistry continues to evolve, deep margin elevation represents a promising approach to achieve superior clinical outcomes and patient satisfaction.

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