

Case Report

Elevating Subgingival Margins: A Case Series in Deep Margin Management

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ABSTRACT:

Introduction: Treating subgingival deep carious defects presents challenges due to limited access and moisture control difficulties. Traditional approaches are often aggressive. The deep margin elevation (DME) procedure has emerged as a modern alternative, aligning with contemporary restorative techniques. **Methods:** Two clinical cases are presented to illustrate the DME procedure's application. Each case describes the stepwise process, highlighting key considerations such as isolation, bonding, and restorative material selection. **Results:** Deep margin elevation offers a conservative and reliable approach for managing subgingival defects, provided meticulous attention to detail is maintained. The cases demonstrate successful restoration placement and favourable patient outcomes. **Conclusion:** Deep margin elevation represents a minimally invasive and efficient method for managing subgingival deep carious defects. Its conservative nature and compatibility with modern restorative materials make it a valuable option for clinicians, warranting further investigation through long-term clinical studies.

Key words: Deep margin elevation; deep subgingival restorations; subgingival caries; cervical margin relocation; Subgingival lesions

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INTRODUCTION

The repair of compromised teeth can be accomplished through either direct or indirect restoration methods. Studies indicate that composite indirect restorations offer advantages for significant cavities, including enhanced anatomical form, contour, fracture resistance, and wear resistance, especially in comparison to direct techniques. Moreover, constructing restorations outside the mouth helps alleviate remaining stresses and ensures that polymerization shrinkage effects are limited to the thin resin cement layer.¹

Typically, large cavities surpass the cemento-enamel junction (CEJ), featuring margins situated deep within sub-gingival regions and often lacking enamel. This presents challenges in preparing the cavity, taking impressions, and applying adhesive cementation under dry conditions.

Instead of resorting to surgical crown lengthening, relocating deep proximal margins is feasible by adding an appropriate layer of composite resin over the existing margin before placing an indirect restoration. Frequently, the surgical techniques may cause further attachment loss and exposure of root concavities and furcations to the oral environment, dentin hypersensitivity, unfavorable crown-to-root ratio, and compromised esthetics. Additionally, this may often delay the delivery of the final restoration.²⁻⁴ Hence, an alternative and more conservative approach called deep margin elevation or proximal box elevation (PBE) technique or coronal margin relocation was presented by Dietschi and Spreafico in 1998.⁵

This technique proposes application of composite resin in the deepest parts of the proximal areas in order to reposition the cervical margin supra-gingivally, which is supposed to facilitate the isolation

and improve impression taking and adhesive cementation of indirect restorations.⁶⁻⁸

Moreover, with current adhesive technology and modern composite resin materials it has become possible to restore even severely damaged teeth. Thus, minimally invasive techniques are used to save a maximum amount of sound tooth substance. The present case report aims to provide an overview of the DME technique when applied in combination with a partial indirect glass-ceramic restoration.

CASE REPORT

Case-1

A 67 year old male patient reported to the department of Conservative Dentistry and Endodontics with a chief complaint of decayed tooth and food lodgment in upper left back tooth region. His medical history was noncontributory to the routine dental care. Intra-oral examination revealed a deep proximal caries w.r.t 26 and on cold test there was immediate response with no lingering, suggesting acute reversible pulpitis w.r.t 26. Radiographic examination showed proximal coronal radiolucency indicating proximal caries extends below the cervical margin (Fig 1a). Considering that the caries extended below the CEJ, deep margin elevation was planned followed by composite inlay.

First Visit

The caries was removed with a high-speed handpiece, and a class II cavity was prepared for an inlay as shown in Fig1b, shaping the walls divergently with

rounded angles and creating a butt-joint Cavo-surface configuration. Thorough isolation was maintained. Additionally, an extended sectional matrix was used (Fig 1c and 1d). Margins were raised coronally to ensure they were at least 1mm above the gingival crevice. Cavity was etched with 37% orthophosphoric acid and rinsed for 15 sec then universal bond adhesive was applied and cured for 20 sec, followed by application of flowable Nanohybrid composite resin with a micro brush, cured and excess was removed with a No.12 BP blade (Fig 1e) and a radiography was taken to confirm any overhangs (Fig 1f). Light body impression material injected onto prepared tooth. Putty impression loaded onto tray for maxillary arch impression; lower arch alginate impression was taken. Shade selection was done using the Vita-pan shade guide. The casts and shade prescription were sent to the laboratory for fabrication of the inlay.

Second Visit

The temporary restoration was removed, and the cavity was cleaned. Acid conditioning and adhesive application were followed by light-curing onto the tooth. The same adhesive was applied to the composite inlay. Cementation with resin luting cement (RelyX), light-curing, and removal of excess cement were performed. Finishing and polishing were done using a composite finishing kit (shofu) (Fig 1g). Finally, occlusion was evaluated, post-operative radiograph was taken (Fig 1h) and post-operative instructions were provided to the patient.

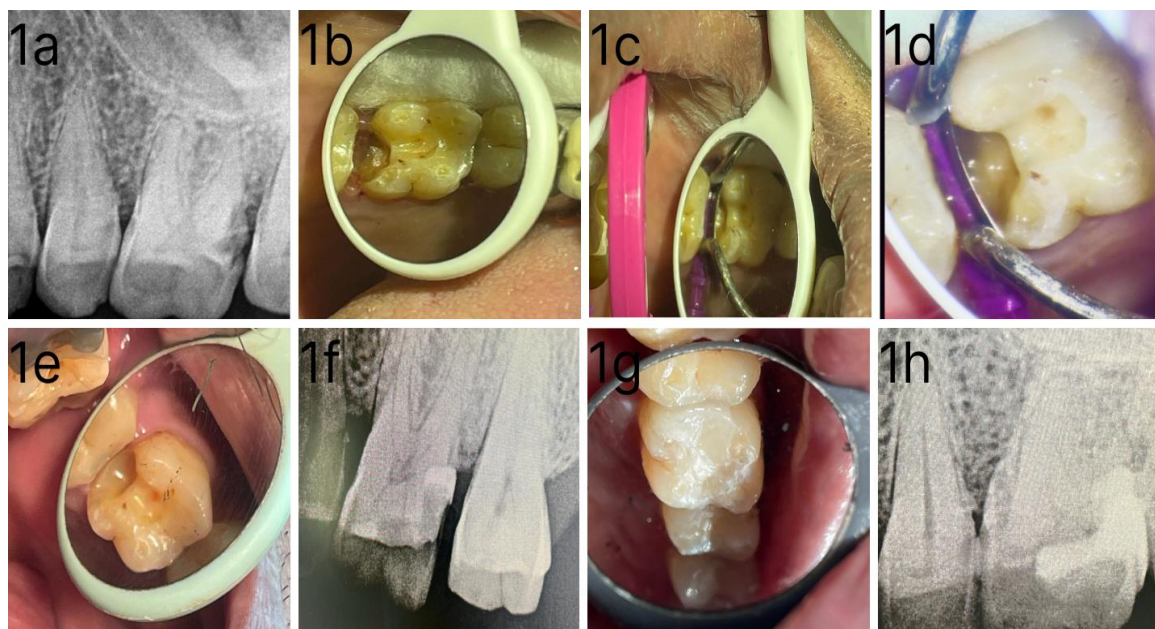


Figure 1: Deep margin elevation followed by composite inlay; 1a- preoperative radiograph showing deep proximal caries; 1b- clinical picture of prepared cavity for composite inlay; 1c & 1d- sectional matrix band placement for margin elevation along with a small cut band to increase the length of restoration; 1e- post operative clinical picture after marginal elevation with flowable composite; 1f: radiograph taken to confirm the elevated margin with no overhangs; 1g- clinical picture after Inlay cementation; 1h- Post operative clinical picture after inlay cementation.

Case-2

A 24 year old male patient reported to the department of Conservative Dentistry and Endodontics with a chief complaint of pain w.r.t upper right back tooth. His medical history was non –contributory to the routine dental care.

Intraoral examination revealed a deep proximal caries w.r.t 16 with chronic irreversible pulpitis. Radiographic examination shows proximal coronal radiolucency indicating proximal caries extends below the cervical margin. (Fig 2a) Access opening was initiated. Working length was determined using electronic apex locator and radiographs. Biomechanical preparation of the tooth was done. Master cone was then selected corresponding to the required biomechanical preparation and then the canals were obturated (Fig 2b). Due to the proximal subgingival extension of the lesion, rubber dam

isolation couldn't prevent the excess bleeding hence application of Teflon tape was done to isolate the margins (Fig 2c). Additionally, the teeth were isolated with cotton rolls. To ensure an optimal workflow a flexible saliva ejector was permanently used with utmost attention to prevent saliva contamination and to facilitate the operative procedures. A layer of flowable composite and then packable composite resin was placed to elevate the gingival margin to a level where it can be sealed with rubber dam (Fig 2d) and a radiograph was taken to confirm the same (Fig 2e).

Thus, the tooth margin was elevated to a restorable and isolatable level. Rubber dam isolation was done thereafter and composite resin was placed incrementally to fill up the cavity (Fig 2f). Finally finishing and polishing was done, followed by a PFM crown (Fig 2g and 2h).

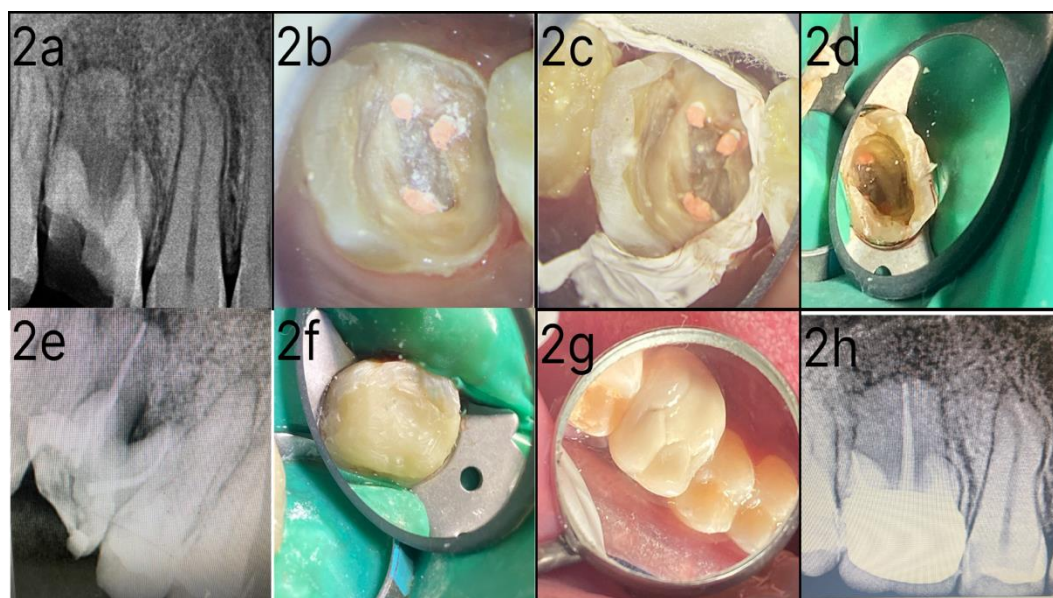


Figure 2: Non-surgical root canal treatment with deep margin elevation 2a- preoperative radiograph showing deep proximal caries involving the pulp tissue; 2b- clinical picture of post obturation; 2c- Teflon Tape placement for isolation and margin elevation; 2d- post operative clinical picture after marginal elevation with flowable composite; 2e: radiograph taken to confirm the elevated margin with no overhangs; 2f- clinical picture after complete post-endo restoration; 2g- Post operative clinical picture after crown cementation; 2h-post operative radiograph after crown cementation.

DISCUSSION

The treatment of subgingival lesions or defects that encroach upon the biologic width presents a significant clinical hurdle, traditionally addressed through surgical crown lengthening or orthodontic extrusion methods. However, advancements in adhesive technology, materials, and isolation techniques have enabled a more conservative approach known as deep margin elevation.

Preserving healthy tooth structures is a primary aim of contemporary restorative dentistry, favoring minimally invasive preparation concepts and protocols.⁹⁻¹⁰ The rationale for DME lies in relocating the restorative margin coronally, rather than

displacing the periodontal margin based on cavity boundaries.

Restorations with margins in dentin and cementum are susceptible to micro-leakage, leading to postoperative sensitivity, marginal staining, and secondary caries development.¹¹ Secondary caries represents the most frequent cause for restoration replacement, serving as the primary etiological failure factor.¹²⁻¹⁵ Consequently, sub-gingival cavities extending beyond the cemento-enamel junction (CEJ) necessitate meticulous assessment and management; ensuring a dry working environment and precision during bonding procedures are essential for achieving satisfactory clinical outcomes.

The Deep margin elevation offers a minimally invasive alternative to procedures like surgical crown lengthening. This method aids in cavity preparation, impression taking, and adhesive cementation under dry conditions. DME potentially enhances light-curing and the marginal integrity of indirect restorations. Moreover, the removal of excess luting composite is more effectively managed when margins are relocated supra-gingivally.¹¹

To enhance the marginal adaptation of DME restorations, the application of flowable composite resins has been recommended.

Another benefit of the DME technique is Immediate Dentin Sealing (IDS)¹⁶, which protects sealed dentin from bacterial infiltration during the provisional phase.

In the clinical scenario described in this article, the occluso-proximal restoration margin was situated significantly below the CEJ. The DME technique employing composite material was employed to raise the cervical margin to a manageable and restorable level.¹⁷

Although, initially the DME technique was developed for semi-direct or indirect restorations, it can also serve as a beneficial preliminary step before placing a significant direct composite resin restoration. In these instances, DME can help in creating enhanced contours and precise proximal contacts. It is essential to consider patient, operator, and material factors during treatment planning and implementation. Nonetheless, DME presents a rapid and convenient clinical approach that eliminates the requirement for surgical, invasive, or lengthy procedures.

CONCLUSION

Deep margin elevation represents a conservative and dependable method for addressing sub-gingival defects, provided it is executed with careful attention to detail to achieve a polished, well-sealed restorative surface that facilitates adaptation and survival of a healthy periodontium. This approach is relatively minimally invasive and time-efficient, and should be considered where appropriate.

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