

## CASE REPORT

# Deep margin elevation with one-year follow-up: A case report

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**Key Clinical Message**

Deep margin elevation (DME) is a conservative treatment of a tooth with extensive subgingival caries. It is an alternative approach to more invasive restorative procedures. The DME enables successful tooth isolation to do root canal treatments and enables performing indirect restorations, improving dental function and patient comfort without complications.

**KEYWORDS**

case report, cervical margin relocation, deep margin elevation, dental caries, proximal box elevation, subgingival margins

## 1 | INTRODUCTION

Treatment of deep subgingival caries presents a significant clinical challenge, often requiring an extraction followed by implant placement or other traditional prosthodontic to replace the missing tooth.<sup>1</sup> While traditional treatments such as orthodontic extrusion and crown lengthening procedures aim to preserve tooth structure can negatively impact gingival health and esthetics.<sup>2</sup> Additionally, implant placement is a good alternative for poor prognosis tooth and is highly predictable but requires invasive surgery, time, and higher cost on the patient.<sup>3,4</sup>

Tooth extraction can often be avoided by performing deep margin elevation (DME), the DME technique has been introduced as a conservative and innovative solution to address restorative challenges with minimal invasiveness and optimal long-term outcomes.<sup>5</sup> Dietschi and Spreafico introduced DME in 1998, as the name indicates, it is the elevation the margins of deep caries lesions that were traditionally indicated for extraction by bonding a dental resin composite base to the deep subgingival margin

of the tooth.<sup>6</sup> The technique facilitates better restoration isolation and simplifies subsequent endodontic and prosthodontic procedures, preserving tooth structure and periodontal integrity. Recent publications have highlighted the efficacy of DME, in posterior molars, reinforcing its utility and durability in complex dental restorations.<sup>7,8</sup>

This case report demonstrates how DME helped a patient with extensive subgingival caries and asymptomatic irreversible pulpitis. It provides a detailed, evidence-based clinical restorative treatment of a case with one-year follow-up. This case demonstrates the practical benefits of DME as an alternative to more invasive traditional methods.

## 2 | CASE PRESENTATION

A 57-year-old female patient presented to our private dental clinic seeking a second opinion regarding the restorability of her mandibular right first molar (tooth #46). She was in good general health, with no significant

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medical history, medications, or allergies. Her primary complaint was discomfort due to food impaction between the maxillary first and second molars, but there was no associated pain. Her dental history was notable only for previous restorative treatments and extractions without complications.

## 2.1 | Clinical findings

An extraoral examination revealed no abnormalities. The intraoral examination revealed that #46 had no mobility. Periodontal probing depths were 2–3 mm with bleeding on probing. The pulp vitality test (cold) was normal, while the caries was extending to the pulp tissue, suggesting asymptomatic irreversible pulpitis on #46. Bitewing X-rays of tooth #46 showed a large distal subgingival carious lesion (Figure 1A).

## 2.2 | Treatment plan

For tooth #46, the treatment options presented were as follows: first, extraction and replacement with either a dental implant, a long-span fixed partial denture, or a removable prosthesis; second, periodontal surgery for clinical crown lengthening or orthodontic extrusion, followed by restoration of the tooth; third, DME and subsequent restoration. After a comprehensive discussion regarding the diagnostic findings, treatment alternatives, potential risks and benefits, and associated costs, the patient elected to proceed with the DME option. This approach necessitated endodontic treatment, core build-up, and a full-coverage indirect restoration for tooth #46.

## 2.3 | Treatment procedure

The treatment began after the patient gave her consent. In the first appointment, inferior alveolar nerve block anesthesia was administered. Under rubber dam isolation, existing caries were removed with a slow-speed round bur. A Tofflemire matrix was modified and then adapted around the tooth using wooden wedges and Teflon tape (Figure 2). Bitewing radiographs confirmed the apical extent of the matrix band below the tooth structure apically (Figure 1B).

The tooth was etched with 37% phosphoric acid and then thoroughly rinsed. Next, a coating of a Scotchbond Universal adhesive system (3M ESPE) was applied, which was then light cured. The process of DME involved first placing a thin layer of Tetric EvoFlow® Bulk Fill (Ivoclar Vivadent AG, Schaan, Liechtenstein), followed by a thicker layer of Tetric EvoCeram bulk fill composite (Ivoclar Vivadent, Schaan, Liechtenstein). This layering used the snowplow method, previously described by Frese et al.,<sup>9</sup> (Figure 1C).

In the subsequent appointment, local anesthesia was administered. The tooth was isolated under a rubber dam. An endodontic access cavity was prepared. The canal orifices were located and initially negotiated with 8–10 K files. The working length was estimated with an electronic apex locator and confirmed radiographically. The root canals were then instrumented, and a 5.25% sodium hypochlorite irrigation was used and subsequently obturated using AH Plus root canal sealer with corresponding gutta percha. The remaining gutta percha in the pulp chamber was removed with a slow-speed round bur to prepare for the core buildup. A dual-cure core buildup composite (MultiCore Flow, Ivoclar) was used for access cavity core buildup.

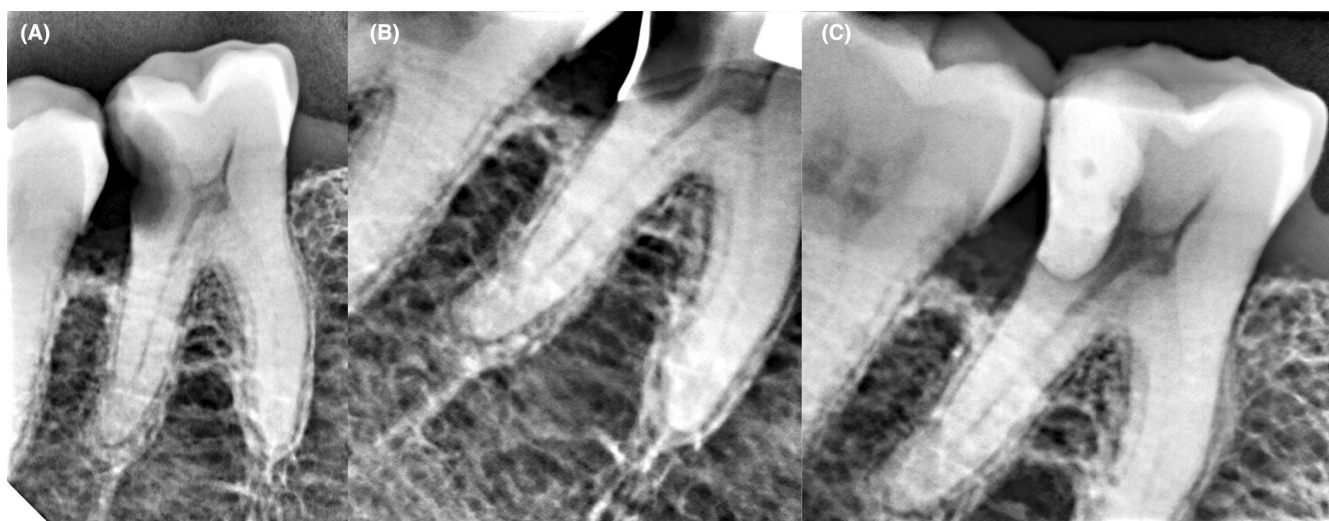


FIGURE 1 (A) Preoperative X-ray showing deep distal caries. (B) Verification of matrix adaptation using a bitewing X-ray. (C) Deep margin elevation performed in two bulk-fill layers using the snowplow technique.

In the next appointment, tooth preparation for a full-coverage zirconia crown and taking a final impression using polyvinyl siloxane impression material were performed (Figure 3A). A provisional crown was fabricated chairside and cemented with temporary cement.

In the final visit, the crown fit, and the proximal contact and occlusion were verified, and then the tooth was isolated with a rubber dam, etched, and a universal adhesive (Scotchbond Universal, 3M) was applied to the tooth. The monolithic zirconia crown was then cemented using dual-cure resin cement (RelyX Unicem, 3M) (Figure 3B). A bitewing radiograph was used to verify the seating of the crown (Figure 3C).

## 2.4 | Follow up

Clinical and radiological examinations and oral hygiene reinforcement were carried out during six-month and one-year follow-up visits. The patient was asymptomatic, and the clinical and radiographic examinations revealed no dental caries, periodontal inflammation, or periradicular inflammation (Figure 4A,B). The patient was satisfied with the treatment outcome, indicating better function and no food accumulation.



FIGURE 2 A modified Tofflemire matrix and holder assembly showing distal apical extension.

## 3 | DISCUSSION

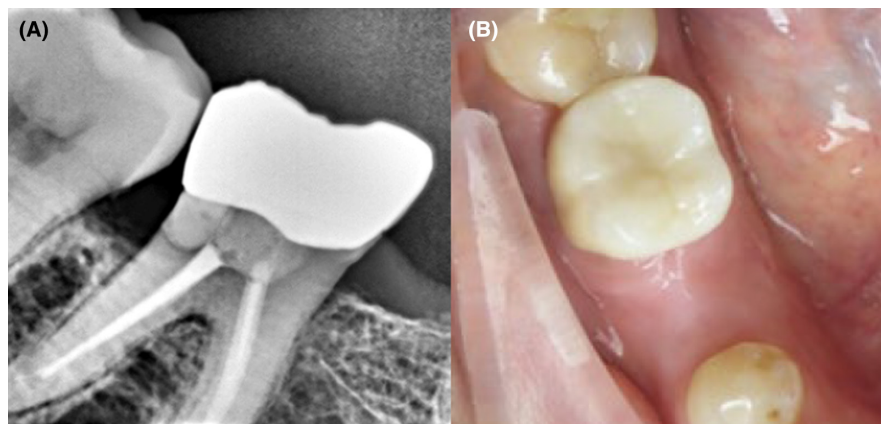
In this case report the use of DME in the treatment of extensive distal subgingival caries in a mandibular right first molar was presented. The DME approach offers several advantages over other tooth replacement methods, such as dental implants, partial fixed dentures, or removable dentures or the traditional methods of crown lengthening.<sup>4,7</sup> These advantages include cost-effectiveness, simplicity and short treatment time, while preserving the natural structure and function of the teeth. However, DME can be unpredictable, especially when “biological width” is violated, such as in young patients with higher interdental bone. Therefore, clinicians must assess each case individually to decide whether DME can be performed, or the alternative treatment options can be considered.

The clinical findings in this case report suggest that DME can be a viable restorative approach even when margins extend closer than the traditionally recommended 3.0 mm biological width to the alveolar bone crest. While consensus guidelines have advised maintaining at least 3.0 mm of supracrestal tissue attachment (STA) to avoid inflammation and attachment loss.<sup>10</sup> More recent evidence indicates this recommendation may be overly conservative, several studies have noted substantial variations in junctional epithelium dimensions, ranging from 1.0–9.0 mm, calling into question the validity of a universal 3.0 mm as a minimum required width from tooth margin to the alveolar bone.<sup>11,12</sup> Ferrari et al.,<sup>13</sup> proposed that DME margins could be safely placed as close as 2.04 mm from bone when combined with strict oral hygiene compliance. Furthermore, literature found that DME to be well-tolerated clinically with proper bonding and isolation.<sup>9,14,15,16</sup> and this adapted “biologic width” appeared healthy and causes minimal periodontal inflammation.<sup>11</sup> Therefore, the



FIGURE 3 (A) Tooth preparation for indirect restoration. (B) Indirect monolithic zirconia crown after cementation. (C) Bitewing X-ray showing good proximal fit of the margins.





**FIGURE 4** (A) Tooth preparation for indirect restoration. (B) Indirect monolithic zirconia crown after cementation.

successful outcome with minimal inflammation seen in this case aligns with the growing body of evidence suggesting slightly reduced “biological width” dimensions may be acceptable for DME restorations when oral hygiene is controlled.

A modified Tofflemire matrix band, packed with Teflon tape and wooden wedges, was used in this case report to facilitate the apical extension and adaptation of the matrix.<sup>5</sup> Other matrix systems and techniques that have been also reported for DME. For instance, an approaches like sectional matrices with Teflon tape apically was reported.<sup>9</sup> Others reported the “M-i-M technique” that combines a circular matrix with an internal sectional matrix.<sup>5</sup> As a general rule, effective isolation is emphasized as critical for proper adhesion and avoidance of contamination in the gingival fluid environment.<sup>5</sup>

In this case report, a universal adhesive system was used because of its versatility and effectiveness in both total etch and selective enamel etch modes.<sup>16,17</sup> The snowplow approach was used to apply the composite restoration, which entailed blending a light-cure flowable composite with a more viscous composite resin.<sup>9</sup> This method was designed to increase the restoration's marginal seal and mechanical qualities, as both flowable and viscous bulk-fill composites have demonstrated appropriate microtensile bond strength and improved performance on enamel surfaces.<sup>18,19</sup>

Despite promising short-term results, the long-term durability and predictability of DME restorations are unclear. Clinical case reports and *in vitro* studies provide the most evidence.<sup>20</sup> Longer-term prospective clinical studies are needed to evaluate the longevity and risks of this technique, particularly how different restorative materials respond to normal functional forces and the stresses of the oral environment and to determine how DME affects periodontal health to enable dentists to choose the technique with the best evidence-based restorative materials.

Finding criteria to select cases is important and requires more research. DME in this case was successful

despite extensive proximal caries, probably because physiological recession in this case helped maintain accepted biological width. Younger patients with higher interdental bone levels may be at greater risk for biological width violations, which could result in periodontal inflammation and attachment loss. Future studies should systematically evaluate outcomes based on factors such as patient age, subgingival extension, and oral hygiene status to develop evidence-based guidelines for case selection.

## 4 | CONCLUSION

This case report presents a successful DME for the treatment of a challenging case of extensive subgingival proximal caries of the mandibular first molar. This case report demonstrates that this conservative clinical strategy is beneficial and consistent with contemporary evidence-based dental practice and patient selection. Clinical longitudinal studies should evaluate long-term outcomes and optimize DME selection criteria to improve predictability and clinical success.

### AUTHOR CONTRIBUTIONS

**Mohammad Aljanakh:** Conceptualization; data curation; formal analysis; software; supervision; writing – original draft; writing – review and editing.

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### CONFLICT OF INTEREST STATEMENT

The author declares that there are no conflicts of interest regarding this paper's content, including dental materials, tools, and equipment.

## DATA AVAILABILITY STATEMENT

The data used in this paper are available from the author upon reasonable request.


## ETHICS STATEMENT

This case report was carried out in compliance with the principles stated in the Declaration of Helsinki.

## CONSENT

The patient provided written informed consent for the dental treatment procedure and the publication of this case report, including any accompanying images, in accordance with the journal's patient consent policy.

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