ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 5, Issue – 6, December - 2022, Page No. : 103 - 108

Deep margin elevation boon to restorative dentistry - A review

[1]Dr. Sudrisya Rajan, Department of Conservative Dentistry and Endodontics, DAPM RV Dental College, Bangalore

[2]Dr Sindhu H, Reader, Department of Conservative Dentistry and Endodontics, DAPM RV Dental College, Bangalore

[3]Dr B S Keshava Prasad, Professor and HOD, Department of Conservative Dentistry and Endodontics, DAPM RV Dental College, Bangalore

Corresponding Author: Dr. Sudrisya Rajan, Department of Conservative Dentistry and Endodontics, DAPM RV Dental College, Bangalore

Citation of this Article: Dr. Sudrisya Rajan, Dr Sindhu H, Dr B S Keshava Prasad, "Deep margin elevation boon to restorative dentistry - A review", IJDSIR- December - 2022, Vol. – 5, Issue - 6, P. No.103– 108.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

Restoration of deep proximal lesions is a challenge faced by dental clinicians in their day-to-day practice. In this clinical situation, indirect restorations are preferred as they have better aesthetics, anatomical form, physical, and mechanical qualities, and less polymerization shrinkage since they are fabricated extra orally, allowing residual stresses to be relieved. However, sub gingival margins still pose a concern since they are challenging to treat because of limited access, rubber dams that slide across the margin, and the chronic saliva, crevice fluid, and blood leakage. This article highlights a conservative approach on 'Deep margin elevation' to overcome the problems associated with restoring tooth with deep proximal margins.

Keywords: Deep margin elevation, Matrix band, Biologic width, Cement enamel junction.

Introduction

The deep margin is a subgingival margin of the prepared carious cavity that is formed after removing unsound tooth tissues from deep structural defects. Generally, these proximal boxes have a limited or complete absence of enamel. [1-2] Restoration of deep carious proximal cavities are challenging in the daily clinical practice. [3-4] This might be associated with sub gingival margins exceeding cement enamel junction. [5-6]

Localized sub gingival margins make it difficult for the use of indirect adhesive restorations (isolation, impression taking, and delivery) which in turn hinder their durability and relationship with the periodontal tissues [7]. Numerous clinical approaches are used to address these concerns. The conventional approach includes orthodontic extrusion, surgical exposure of the cervical margin, or a combination of both techniques which leads to the apical displacement of supporting tissues to access the sub gingival margin and obtain

adequate space for the establishment of biological width (BW).Frequently, the above-mentioned techniques can cause further attachment loss and exposure of root concavities and furcations to the oral environment, dentin hypersensitivity, and unfavourable crown to root ratio as well as compromised esthetics, ultimately delaying delivery of the final restoration.[8-10] The second approach so-called “Deep Margin Elevation” (DME), introduced by Diets chi and Spreafico (1998), over 25 years ago is to apply a base of composite resin over the pre-existing cervical margin to relocate it coronally. [11-12]

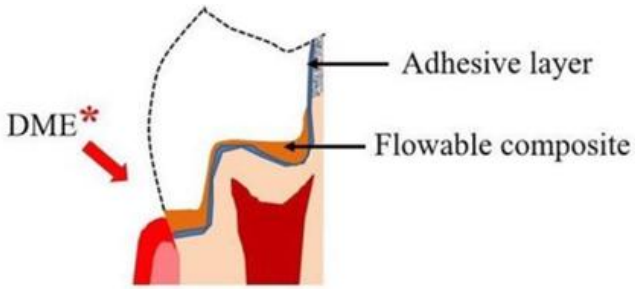


Fig 1:

Synonyms

Coronal Margin Relocation, Proximal Box Elevation, Cervical Margin Relocation, Open sandwich technique

The DME criteria

To perform DME, the following criteria are to be satisfied;

1. Isolation of the working field.

2. The matrix placed should isolate margins accurately and ensure a perfect seal around them.

3. The matrix should not violate the connective compartment of biologic width. [11,13]

The art of dme

After completing the subgingival aspect of the preparation, a matrix is placed and tightly adapted to the tooth structure. In most cases, a wedge is not placed, enabling the margin elevation to reproduce an appropriate emergence profile.

The tooth is treated using the etching and bonding protocol of your choice (for composite) or a tooth conditioner (for glass ionomer or RMGI). The material is allowed to flow passively against the matrix until it is at an equigingival or supragingival location. Typically, a post-operative bitewing radiograph is taken to confirm the proper adaptation of restorative material to tooth structure, especially when deep margin elevation is being used to elevate a margin for indirect restorations. When performed in a limited area, deep margin elevation can be utilized in close proximity to the bone with negligible effects on the biologic width.

In some cases, the matrix band may need to be adapted in order to accommodate the subgingival aspect of the preparation. Either a #2 Tofflemire band or a modified #1 Tofflemire band can be used to extend the matrix to ensure an adequate seal of the margin elevation material to the tooth. [14-15]

Integrals for successful DME

1. It is preferable to use a curved matrix (Greater Curve or a comparable "banana matrix"). Although a traditional matrix will allow the isolation and elevation of margins placed above the CEJ, it creates an insufficient gingival emergence profile and contour for margins positioned in the vicinity of the cementoenamel junction (CEJ)

2. The matrix must be supported by enough buccal and lingual walls of the remaining tooth structure. Localized elevation is feasible;however, matrix instability and collapse will typically prevent extensive elevation in the buccal and lingual directions.

3. The matrix height must be reduced to 2–3 mm (slightly higher than the desired elevation). The matrix's narrowness will make it easier for it to slide sub gingivally and effectively seal the margin. Usually, wedging is not possible.

4. The clinician must confirm that successful root canal therapy has been accomplished for teeth that have had endodontic treatment. The entrance to the canals should also be covered with a glass-ionomer barrier. Prior to receiving root canal therapy, adequate isolation can be established using DME.

5. The gingival margin must be sealed by the matrix once it has been applied, and neither gingival tissue nor a rubber dam should be present in the space between the margin and the matrix.

6. A fine diamond bur or oscillating tips (such as Hemisphere or Prep Ceram tips, Kavo) should be used to carefully re-prepare the margin before bonding. This will guarantee the removal of any debris and other dentin contamination that might have happened during the installation of the matrix.

7. In order to apply IDS to the preparation while the matrix is present, a three-step etch-and-rinse dentin adhesive (such as Optibond FL, Kerr) should be used. Next, a composite resin base should be placed, which will move the margin by about 2 mm (one to two increments). This step of the procedure is similar to that for a direct composite resin restoration.

8. Elevation can be accomplished using a variety of composite resins (traditional restorative or flowable). It is advised to warm a micro hybrid or nanohybrid restorative material before use (Cal set, Ad Dent) to make installation easier and reduce the possibility of interlayer gaps. It is recommended to do the final polymerization through an air-blocking layer of glycerine gel.

9. After the margin has been raised, use a no. 12 blade or a sickle scaler to carefully remove any excess composite resin flash from the area around the tooth. Flossing between the teeth is performed to make sure there are no overhangs or flashes. Re-preparing any enamel margins to get rid of extra adhesive resin is also advised.

10. before moving on to final preparation and impressions, a bitewing radiograph should be performed to make sure there are no excesses or gaps. It's fascinating to note that the periodontal health of the restored tooth may not be impacted by the existence of a deep subgingival sticky margin.

11. If a lesion is very deep and localised, the matrix-in-a-matrix approach is the last resort. This method involves sliding a sectioned piece of metal matrix between the existing matrix and the margin. [6-7,10]

Advantages of DME

1. It is a non-invasive procedure
2. Provides a faster, higher-quality and more convenient isolation with rubber dam, and maintaining dry conditions during the whole adhesive fixation of indirect restoration [16-17]
3. Furthermore, the removal of excess luting composite is better controlled when the margin is relocated supra gingivally [18]
4. The supragingival margins provide a simplified approach to optical and conventional impression taking [1,17]
5. At last, liner or base is placed underneath inlays and onlay's to avoid excess tissue preparation, which is necessary to fulfil geometrical restrictions of indirect restorations; which functions as a protective layer for pulpo-dentin complex under temporary fillings [11,19]

Matrix systems for margin elevation

1. Reel matrix system

It is a matrix system with deep margin elevation bands, introduced by the brand 'Garrison'.

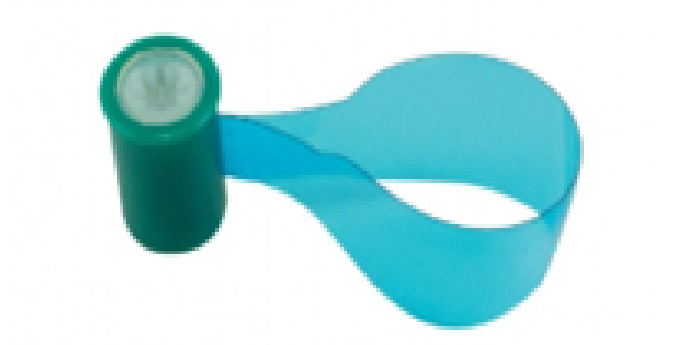


Fig 2:

The kit contains

20 x Margin Elevation Matrices

60 x Assorted Matrices

1 x Tensioning Instrument

1 x Perform Instruments Kit

In order to perform a composite margin elevation, the Reel Matrix Margin Elevation matrices provide optimal adaption and closure of deep sections. [20]

2. Matrix in a matrix technique

The method makes use of a modified circumferential matrix that focus on the local isolation of the deep margin. By inserting a sectional band inside the circumferential matrix and sandwiching Teflon tape between the two bands, the matrix-in-a-matrix approach, an advancement of the technology, makes it easier to isolate and fit the subgingival matrix. This modified deep margin elevation creates excellent conditions for scanning or impression-making by potentially avoiding resective operations, invasive restorative procedures, and occasionally even extractions. [21]

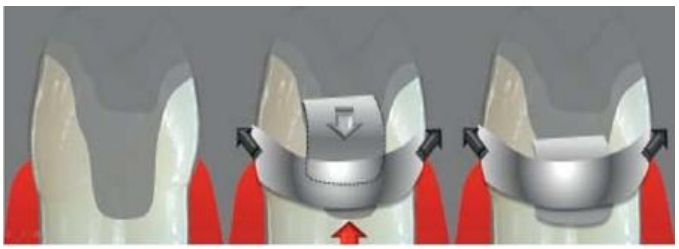
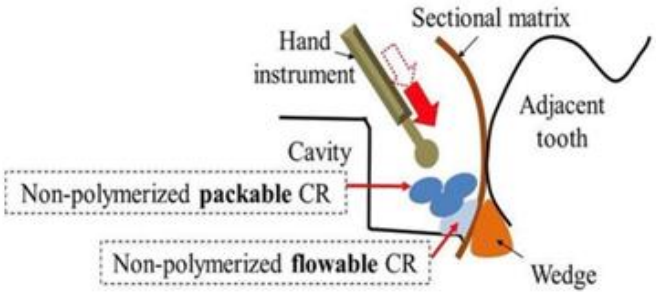


Fig 3:

3. Snow plough technique

Involve the application of a small amount of flowable composite resin on to the floor of the cavity and then gently press with a packable composite allowing the flowable composite resin to adapt well to the cavity floor. [22]



4. Margin elevation band non-stick Tofflemire-style matrices

These are the first Tofflemire-style ensembles to essentially solve the issue of challenging matrix bands. Bonding agent adhesion is drastically reduced by a micro-thin coating when it is bonded to either dead-soft or ordinary stainless steel—by a staggering 92%.

When wrapped around a tooth, the Right-CurveTM matrix band forms a substantially larger funnel-shaped cone, resulting in a lower contact point and better isolation:

- A tighter gingival seal is produced by a funnel shape because it can reach the neighbouring tooth more easily.
- Establishes more extensive connections
- Very wide preps are made simpler
- Increased core build up visibility
- The gingival adaption and contour for the deep margin areas will be best provided by the Margin Elevation matrix
- Height of matrix is reduced to enable better adaption to deep margin areas. [23]

Conclusion

DME is a promising method that relocates the cervical margin coronally in a conservative manner, enabling field isolation, impression taking, and cementations that can be used in both direct and indirect restorations. Nevertheless, this method offers a useful alternative for patients who cannot afford more invasive procedures.

References

1. Veneziani M. Adhesive restorations in the posterior area with subgingival cervical margins: new classification and differentiated treatm Ent approach. Eur J Esthet Dent. 2010;5(1):50-76.

2. Barone A, Derchi G, Rossi A, M arconcini S, Covani U. Longitudinal clinical evaluation of bonded com posite inlays: a 3-year study. Quintessence International. 2008; 39:65-71.

3. Mangani F, Marini S, Barabanti N, Preti A, Cerutti A. The success of indirect restorations in posterior teeth: a system atic review of the literature. Minerva Stomatol. 2015;64(5):231-40

4. Deep margin elevation: a systematic review Z.S. Khabadze, I.V. Bagdasarova, E.S. Shilyaeva, A.P. Kotelnikova, D.A. Nazarova, Yu.A. Bakayev, S.M. Abdulkerimova

5. Deep Margin Elevation: A Literature ReviewTheodora Kalliopi Samartzi,[1,*] Dimokritos Papalexopoulos,[2] PanagiotisNtovas,[3] Christos Rahiotis,[3] and Markus B. Blatz[4]

6. Deep Margin Elevation: A Paradigm Shift Pascal Magne, DMD, PhD Don and Sybil Harrington Professor of Esthetic Dentistry, Restorative Sciences, Ostrow School of Dentistry, University of Southern California, Los Angeles, California, USA.

7. Nugala B., Kumar B.S., Sahitya S., Krishna P.M. Biologic width and its importance in periodontal and restorative dentistry. J. Conserve. Dent. 2012; 15:12–17. doi: 10.4103/0972-0707.92599.

8. Padbury A., Jr., Eber R., Wang H.-L. Interactions between the gingiva and the margin of restorations. J. Clin. Periodontol. 2003; 30:379–385. doi: 10.1034/j.1600-051X.2003.01277.x.

9. Planciunas L., Puriene A., Mackeviciene G. Surgical lengthening of the clinical tooth crown. Stomatologija. 2006; 8:88–95.

10. Magne P., Spreafico R. Deep margin elevation: A paradigm shift. Amer. J. Esthet. Dent. 2012; 2:86–96

11. Diets chi D., Spreafico R. Current clinical concepts for adhesive cementation of tooth-coloured posterior restorations. Pract. Periodontics Aesthetic Dent. 1998; 10:47–54.

12. Dablanca-Blanco A.B., Blanco-Carrion J., Martín-Biedma B., Varela-Patiño P., Bello-Castro A., Castelo-Baz P. Management of large class II lesions in molars: How to restore and when to perform surgical crown lengthening? Restor. Dent. Endod. 2017; 42:240–252. doi: 10.5395/rde.2017.42.3.240.

13. Benefits of Deep Margin Elevation for Treating Subgingival Margins By Andy Janiga

14. Frese, C., et al. “Proximal box elevation with resin composite and the dogma of biologic width: Clinical R2-technique and critical review.”Operative Dentistry2014, 39-1: 22-31

15. Eichelsbacher F, DenerW, MBJCFS# 4DIMBHFOIBVG6 Periodontal status of teeth with

crown-root fractures: Results two years after adhesive fragment reattachment. J Clin Periodontol 2009; 36:905–911.

16. Poggendorff MJ, Kramer N, Dippold C, Vosen VE, Naumann M, Jablonski-M om eni A, Franken Berger R. Effect of proximal box elevation with resin com posite on marginal quality of resin com posite inlays in vitro. J Dent. 2012;40(12):1068-73.

17. Zaruba M, Gohring TN, W egehaupt FJ, Attin T. Influence of a proximal margin elevation technique on marginal adaptation of ceramic inlays. Acta Odontol Scand. 2013;71(2):317-24.

18. Ilgenstein I, Zitzmann NU, Buhler J, Wegehaupt FJ, Atin T, Weiger R, Krastl G. Influence of proximal box elevation on the marginal quality and fracture behaviour of root-filled molars restored with CAD/CAM ceramic or com posite onlay's. Clin Oral Investig. 2015;19(5):1021-8.

19. Rocca GT, Gregor L, Sandoval MJ, Krejci I, Diets chi D. In vitro evaluation of marginal and internal adaptation after occlusal stressing of indirect class II com posite restorations with different resinous bases and interface treatm ents. "Post-fatigue adaptation of indirect com posite restorations". Clin Oral Investig. 2012;16(5):1385-93

20. https://www.garrisondental.com/products/reelmatrixtm-and-deep-margin-elevation-kits

21. Magne P. M-i-M for DME: matrix-in-a-matrix technique for deep margin elevation. J Prosthet Dent. 2021 Dec 25: S0022-3913(21)00655-7. doi: 10.1016/j.prosdent.2021.11.021. Epub ahead of print. PMID: 34961611.

22. Opdam NJ, Roeters JJ, de Boer T, Pesschier D, Bronkhorst E. Voids and porosities in class I micropreparations filled with various resin composites. Operative Dentistry. 2003 Jan 1;28(1):9-14.

23. https://www.dentsupply.eu/products/garrison-composi-tight-slick-bands-margin-elevation-band