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Cervical margin relocation in indirect posterior adhesive restorations – a case report

Przesunięcie brzegu dodziąsłowego w pośrednich wypełnieniach adhezyjnych w odcinku bocznym – opis przypadku

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Summary

Cervical margin relocation (CMR), also known as deep margin elevation, is a minimally invasive restorative technique used to reposition subgingival margins to a supragingival level. Subgingival margins, extending below the cemento-enamel junction (CEJ) present significant biological risk including violating the biological width, potentially causing inflammation, attachment loss and periodontal deterioration. CMR provides a conservative alternative to conventional management (surgical crown lengthening and orthodontic extrusion) lengthening for managing deep subgingival margins while maintaining tissue preservation and restorative predictability, improving accessibility and bonding reliability. Despite its growing clinical adoption and alignment with minimally invasive principles, concerns persist regarding bonding predictability on dentine or cementum substrates and the long-term stability of the adhesive interface. This case report illustrates the clinical protocol of CMR performed prior to indirect ceramic restoration on an endodontically treated posterior tooth. A step-by-step description and literature-

Streszczenie

Relokacja brzegu dodziąsłowego (CMR), znana również jako podniesienie głębokiego brzegu, to małoinwazyjna technika odtwórcza stosowana w celu repozycji marginesów poddziąsłowych do poziomu nadziąsłowego. Marginesy poddziąsłowe, sięgające poniżej połączenia szkliwno-cementowego (CEJ), stwarzają znaczne ryzyko biologiczne, takie jak naruszenie szerokości biologicznej, potencjalnie powodując stan zapalny, utratę przyczepu łącznotkankowego i pogorszenie stanu przyzębia. CMR stanowi zachowawczą alternatywę dla konwencjonalnego leczenia (chirurgicznego wydłużania korony i ekstruzji ortodontycznej) w leczeniu głębokich brzegów poddziąsłowych, przy jednoczesnym zachowaniu istniejących tkanek i przewidywalności odbudowy, poprawiając dostęp i niezawodność wiązania. Pomimo rosnącej akceptacji klinicznej i zgodności z zasadami małoinwazyjnymi, nadal istnieją obawy dotyczące przewidywalności wiązania z zębiną lub cementem oraz długoczasowej stabilności połączenia adhezyjnego. Niniejszy opis przypadku ilustruje protokół kliniczny CMR wykonany przed pośrednią odbudową ceramiczną

based discussion highlight its advantages, material choices and limitations in relation to biological width preservation and periodontal health.

w zębie bocznym leczonym endodontycznie. Opis krok po kroku i omówienie literatury podkreślają zalety, dobór materiałów i ograniczenia w odniesieniu do zachowania szerokości biologicznej i zdrowia przyzębia.

Introduction

Restoring large posterior defects with proximal caries that extend below the cemento-enamel junction (CEJ) and into subgingival areas presents a frequent and challenging clinical scenario. These cases are associated with both biological and technical-operative complications. From a biological perspective, subgingival margins risk violating the "biological width" – a critical 3 mm dimension between the restorative margin and the alveolar crest – potentially leading to inflammation, attachment loss and periodontal damage. Maintaining this space is essential to avoid adverse effects on the surrounding tissues.[1]

Traditionally, this issue is addressed by surgical crown lengthening or orthodontic extrusion, both of which reposition the margin into a more accessible zone. While effective, these approaches are invasive, time-consuming, and may compromise aesthetics and tissue preservation.

Technically, subgingival restorations are difficult to isolate, complicating preparation, impression-taking, adhesive cementation and finish. Rubber dam placement is often unfeasible, increasing the risk of contamination and adhesive failure.

To overcome these limitations, cervical margin relocation (CMR) – also known as deep margin elevation (DME) – was introduced by Dietschi and Spreafico in 1998. This minimally invasive technique uses composite resin to elevate deep margins to a supragingival level, thereby improving visibility, access, isolation and adhesive procedures. It has since been adopted under various names such as coronal margin relocation or proximal box elevation. CMR offers a conservative alternative to surgery, aligning with the principles of Minimally Invasive Dentistry.[2] However, the main limitation of this technique lies in the localization of the cervical defect itself. The restorative margin should not extend beyond the epithelial attachment, which corresponds to the area where enamel is normally present. When the margin is positioned deeper – below this level – bonding predictability decreases because adhesion occurs primarily on dentine or cementum, tissues that are more technique-sensitive and less reliable than enamel.[3] Despite growing clinical adoption, scientific evidence supporting the effectiveness of CMR remains limited. Therefore, this article aims to summarize current knowledge on the clinical performance, benefits, limitations and material considerations of CMR when used prior to adhesive cementation of indirect restorations.

Case report

A 23-year-old young patient, A.A., in a good general health, consulted the dental medicine department at Sahloul University Hospital in Sousse for the prosthetic rehabilitation of the upper left first molar (tooth #26), which had previously undergone endodontic treatment. Following the removal of the temporary filling material and a thorough clinical and radiographic assessment of the remaining tooth structure, the tooth was found to be completely asymptomatic and it was noted that the mesial proximal margin extended into the sulcus (Fig. 1a).

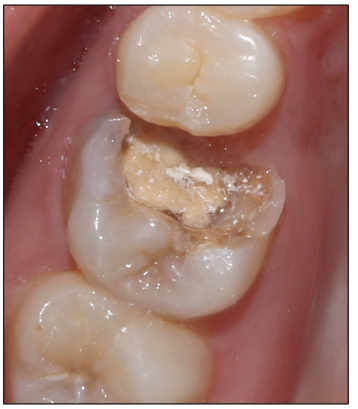

Fig. 1a – intraoral view at initial clinical situation.

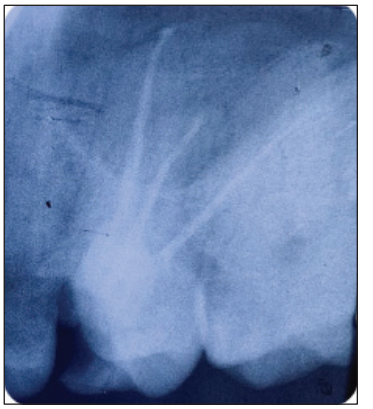

Fig. 1b – periapical radiograph of tooth 26.

Radiographic examination findings: the tooth had been endodontically treated and the root canal treatment was deemed satisfactory (Fig. 1b).

The prosthetic decision was to proceed with a minimally invasive ceramic inlay/onlay restoration (IPS e.max press, Ivoclar Vivadent, Zurich, Switzerland), preceded by a proximal margin elevation as part of the pre-prosthetic protocol.

To begin with, isolation of the operative field is essential during any adhesive protocol. This is achieved using a rubber dam, a clamp, and, when necessary, additional isolation aids such as ligatures, Teflon tape, or even light-curable liquid dam materials. Failure to achieve proper isolation at this stage constitutes a major contraindication for proceeding with this technique.

Moving on to matrix placement, which is a critical step for the success of deep margin elevation (DME): it ensures marginal adaptation, helps define the emergence profile, and contributes significantly to the isolation of the cavity. Regarding the choice of matrix system, one may opt for a circumferential matrix system (such as Tofflemire® or Automatrix®), or alternatively, a sectional matrix system to simplify the clinical procedure and reduce intraoral bulk.

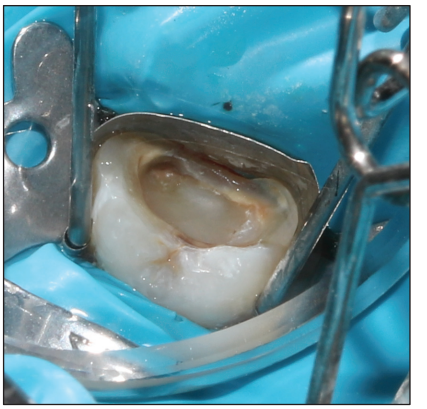

Fig. 2. Isolation of the residual dental margin.

Regarding the choice of the matrix band, it is recommended to use a curved metal matrix and to reduce its height to 2–3 mm above the desired final margin level, in order to achieve a proximal contour that closely follows the natural anatomy of the tooth.[1]

In certain cases, with very deep and localized cervical margins, a single matrix may be insufficient. In such situations, Magne proposed the "matrix-in-matrix" technique, which involves the use of a double matrix system (Fig. 2).[2]

As the next clinical step, the etching of the enamel with 37% orthophosphoric acid (DENTOETCH, phosphoric acid 37%, ITENA, Villepint, France) is performed for 30 seconds, followed by etching of the dentine for 15 seconds. This is then thoroughly rinsed

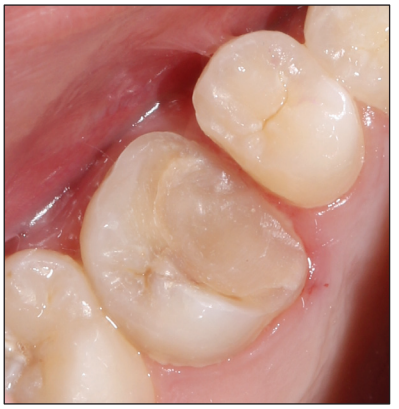

Fig. 3a. Clinical result of the Deep Margin Elevation.

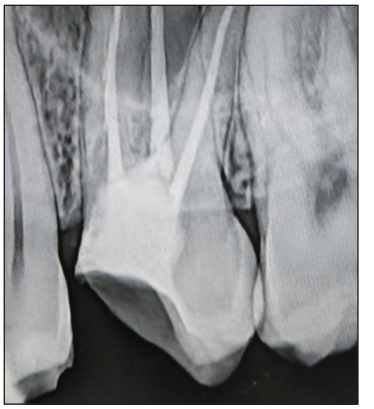

Fig. 3b. Radiographical result of the Deep Margin Elevation.

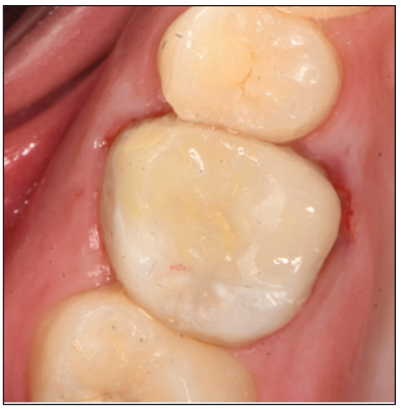

Fig. 4. Final result of the tooth restored using an e-max inlay onlay.

and gently air-dried to avoid desiccation of the dentine. The next step involves the application of the adhesive system (Iperbond Max, Universal adhesive, ITENA, ville print, France), which is light-cured according to the manufacturer's instructions. Subsequently, a bulk-fill composite resin (Filtek Bulk Fill Composite, 3M ESPE, Minnesota, United States) is applied in a single increment and light-cured for 40 seconds, as recommended for deep margin elevation procedures. The use of bulk-fill materials allows adequate depth of cure and reduces polymerization stress while ensuring good marginal adaptation and handling efficiency.

Following the layering and curing of the composite, finishing and polishing are performed – a critical phase of the clinical protocol. This is achieved using rotary instruments with progressively finer grits to achieve a smooth and anatomically correct surface.

Finally, after removal of the rubber dam and radiographic evaluation, the adaptation of the relocated resin margin is assessed. The final result confirms the successful reestablishment of the biological continuum (Fig. 3).

The tooth was ultimately restored with an e-max ceramic inlay-onlay (Fig. 4).

Discussion

Deep margin elevation (DME) is important in restoring posterior teeth because it safely relocates deep subgingival margins to a supragingival position, improving isolation, bonding, impression-taking and microleakage control while maintaining periodontal health and long-term restoration survival when properly executed.[4]

Margin Adaptation

Six *in vitro* studies using SEM compared marginal integrity of restorations placed directly on dentine versus those with CMR composite base layers, before and after thermomechanical loading (TML).[3–6,10,11] Most found no significant differences in marginal continuity between

conventional luting and CMR techniques.[3,5–6,10] One study reported superior adaptation for the conventional method after TML compared to single-layer CMR,[6] but multilayer CMR (three 1 mm increments) matched conventional outcomes.[7,11] Given these findings, the decision to use multilayer composite CMR in our patient was aimed at optimizing marginal seal and minimizing degradation after TML.

Material Choice for CMR

Studies comparing low-viscosity (flowable) and high-viscosity (packable or microhybrid) composites for CMR have demonstrated no significant differences in marginal integrity before or after thermomechanical loading (TML).[8] In clinical practice, both viscosities can therefore be used complementarily: a thin layer of flowable composite is first applied to enhance adaptation to the cavity floor and internal walls, followed by incremental buildup using a more viscous composite to provide mechanical strength and control of the emergence profile. This combined-layering technique optimizes marginal adaptation, minimizes voids and ensures long-term stability of the elevated margin.

Restoration Material & Interface Integrity

Two studies assessed CAD/CAM onlays (feldspathic ceramic vs. resin composite) with or without CMR. *Ilgenstein* et al. found superior marginal integrity for composite onlays compared to ceramic after TML, especially at the onlay-to-CMR interface.[5] Meanwhile, *Spreafico* et al. observed no significant difference between lithium disilicate and composite crowns, regardless of CMR.[8] This evidence supports the use of Emax ceramic, as was in our case, provided meticulous attention is paid to margin adaptation during cementation.

Bond Strength

Microtensile bond strength (MTBS) tests showed that when self-adhesive cements were used, CMR significantly improved bond strength; however, with total-etch cements, no significant difference was observed.[9] In our clinical context, this suggests that margin elevation effectively enhances bonding when using self-adhesive luting agents.

Periodontal Considerations

Despite its minimally invasive nature, CMR can impact periodontal health if not properly planned. The initial localization of the cervical defect is therefore crucial: the restorative margin must remain within a zone that respects the biological width and does not encroach upon the epithelial attachment. Failure to correctly assess this level may predispose to chronic inflammation and bleeding-on-probing (BoP). Clinical data confirm a higher incidence of BoP in CMR-treated cases compared to conventional shoulder margins – 53% vs. 31.5%, respectively.[12] In our patient's case, accurate evaluation of the defect's depth and maintaining a supragingival relocated margin were essential to preserve periodontal integrity and minimize BoP risk.

Limitations & Need for Clinical Evidence

Currently, no long-term randomized clinical trials compare CMR with surgical crown lengthening or orthodontic extrusion.[3,12,13] Most evidence remains *in vitro*, underscoring the necessity for clinical validation.

Conclusion

In summary, while the CMR (Cervical Margin Relocation) technique demonstrates promising preliminary outcomes, including favourable long-term survival rates, its clinical application remains limited due to several procedural challenges and contraindications. Current literature does not provide sufficient scientific evidence to conclusively support or refute its routine use in managing deep subgingival

defects with indirect adhesive restorations. To better assess its viability and impact on both restorative longevity and periodontal health, well-designed randomized controlled clinical trials are essential. Until such data becomes available, clinicians should exercise caution and consider individual case factors carefully when opting for CMR over more established procedures like crown lengthening.

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