

Indirect Resin Onlay Cemented with Self-adhesive Resin Cement: A Comprehensive Clinical Overview

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ABSTRACT

Advances in adhesive technology and esthetic dental materials have permitted clinicians to perform conservative preparation of the dentition for onlay restorations. Indirect resin onlays are a great alternative to dental crowns for reestablishment the function and esthetic in teeth with great destruction.

Keywords: Onlay, Resin cements, Composite resin.

Key messages: Indirect resin onlay is economical solution to satisfy the function and esthetic requirements of these patients. The cementation with self-adhesive resin cement is practice, fast and reduces the postoperative sensitivity.

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INTRODUCTION

An onlay is an indirect restoration when decay or fracture incorporate one or more cusps of a tooth that make amalgam or composite restorations essentially inadequate, extending through and beyond the cusp tip to the facial/lingual and proximal slopes of the covered cusps.¹ Advances in adhesive dentistry methods and esthetic dental materials have enabled clinicians to make conservative preparations of the teeth for the placement of restorations that reinforce the remaining tooth structure.²

The directly placed resin restoration is clearly the most conservative posterior restoration in contemporary dentistry; however, the direct composite is subject to shrinkage when it is light cured. The polymerization process continues to be a major problem. The shrinkage may be between 2 and 9% by volume.³ The material's shrinkage, associated with dynamic development of elastic modulus, creates stresses within the material and its interface with the tooth structure, making marginal failure and subsequent secondary caries, marginal staining, restoration displacement, tooth fracture and postoperative sensitivity.⁴

The ultimate success and longevity are functions of the materials used in the restoration, the technique used by the clinician and the laboratory technician and the patient's care.⁵

In comparison with ceramic materials, onlay restorations composed of composite resin can generally be fabricated with greater ease in the laboratory. Moreover, it also demonstrates improved wear compatibility against opposing tooth structure⁶ and it may demonstrate less abrasion to the opposing dentition than porcelain restoration.⁷ Another advantage is the ease of repair, which can be done intraorally.⁶ The use of porcelain restoration can be recommended in extension restoration to better support occlusal forces.⁸

The clinical sequence demonstrated herein, highlights of the use of self-adhesive cement for luting of indirect esthetic restoration.

CASE REPORT

A 26-year-old woman in excellent health was referred due to the appearance of her first upper maxillary tooth, which had been restored with metallic material. The clinical examination revealed an old amalgam that presented some degree of marginal misfit in the tooth/material interface (Fig. 1). A tooth color selection of occlusal region was checked before drying the tooth with VITA classical shade guide (Fig. 2). It is important to remind that the tooth color becomes clearer when the tooth is dried due to the loss of water.

For esthetic onlay restoration, bevels and retention forms are unnecessary. The walls of the cavity are flared between 5° and 15° and the internal angles are rounded, the minimum isthmus width is 2 mm, and the minimum depth thickness is 1.5 mm. The nonworking and working cups should be covered with a minimum of 1.5 and 2 mm respectively. The gingival margin trimmers should be used to remove unsupported enamel rods in gingival floor and pulp-axial line angle. The finishing of the cavity walls was refined with fine and extrafine diamond finishing burs respectively.

After finishing, the cavity walls and gingival floor should be smooth and visible respectively (Fig. 3). This cavity characteristic prevents the formation of tension and possible cracks on the onlay material. The impression was made from silicon and the finish line is required for onlay, which must be clear and visible, so that the onlay is well-adapted to avoid adjustment. The finish line is a critical part that may show gaps between the onlay and the finish line of tooth, if it is not well finished. Immediate dentin sealing (previous



Fig. 1: Preoperative view



Fig. 4: Thirty-seven percent phosphoric acid was applied on dentin (15s) enamel during 30s



Fig. 2: Tooth color selection of occlusal region



Fig. 5: Primer/adhesive (one bottle) was applied (Stae, SDI)



Fig. 3: Occlusal view of the onlay cavity

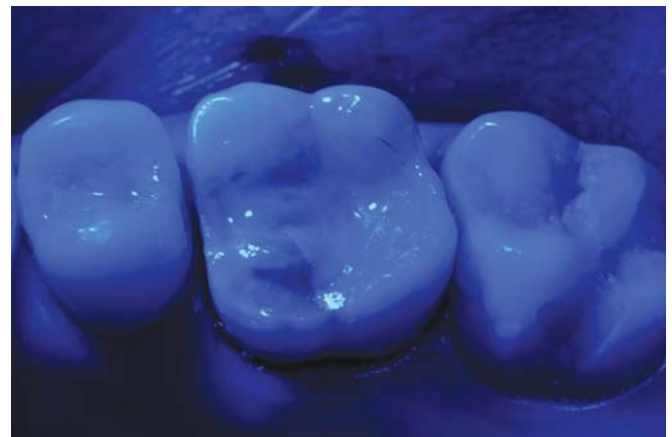


Fig. 6: The adhesive system was light-cured during 20s

hybridization) is traditionally performed with indirect restorations (Figs 4 to 6).

The temporary material was applied and the patient received postoperative care instructions. Onlay was performed in the dental laboratory from indirect composite resin (Fig. 7). The indirect composite was placed in the onlay cavity and the proximal contact was adjusted. The onlay was internally etched with 37% phosphoric acid during 15s and washed thoroughly (Figs 8 and 9) followed by silane coupling agent (Fig. 10).

The self-adhesive resin cement (SET resin cement, SDI) was used for luting following manufacturer's instruction (Figs 11 and 12). This cement was chosen as it does not require pretreatment of the dental substrate. After removing the rubber dam, the occlusion was checked and adjusted with extrafine diamond finishing burs (Fig. 13). Finishing with appropriate tip was used in order to achieve a smooth surface (Fig. 14). The final result is depicted in Figure 15.



Fig. 7: Indirect composite resin was applied in the laboratory

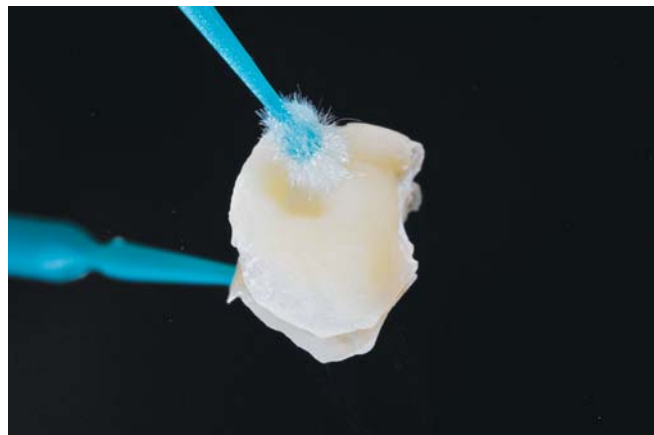


Fig. 10: The silane coupling agent was applied during 1 minute



Fig. 8: Thirty-seven percent phosphoric acid was applied during 15s



Fig. 11: The resin cement was applied in the onlay cavity



Fig. 9: The composite was washed thoroughly



Fig. 12: The onlay composite was cemented

DISCUSSION

The onlay indirect restorations have wide acceptance because they are able to restore the esthetic and at the same time protect the vulnerable areas of dental structure. On the effect of cavity design, the onlay design was more efficacious in protecting the tooth structures than the inlay design.⁸

The continued evolution of adhesive technology and materials has increased the application of composite

materials for the direct and indirect restoration of posterior dentition.⁹ The esthetical dental materials have developed greatly, and several indirect materials were introduced.

In the clinical case reported the ceromer was employed for indirect restoration. Prospective clinical trials has found satisfactory clinical acceptability of ceromer used for inlay and onlay restorations of posterior teeth.¹⁰ Also, class II cavity preparations restored with indirect ceromer offered greater resistance to fracture than did intact teeth.¹¹



Fig. 13: Extrafine diamond finishing burs was used to remove the excess after checking occlusion



Fig. 14: Extrafine abrasion tip was used for polishing



Fig. 15: Final view

A correct preparation of the dental structure is important for the success of indirect restorative treatment. However, some details when observed decrease the dentinal microleakage and sensitivity ensuring the longevity of treatment.

Immediate dentin sealing (previous hybridization) was performed in the case reported, because with indirect

restorations this technique has many advantages. Preventing or reducing problems such as bacterial contamination and tooth sensitivity during the provisional phase between tooth preparation and placement of the final restoration that are some relevant advantages presented;⁸ tooth sensitivity is reduced after immediate dentin sealing;¹² the use of anesthesia at the delivery appointment is unnecessary.¹³

After considering the advantages of the immediate dentin sealing technique, it is important to enquire about the bond strength with this technique. Pascal Magne et al¹² prove that the immediate dentin sealing technique provided a bond strength similar to that of the direct composite.¹⁴ Lee and Park¹⁵ show higher values of bond strength after this technique.

Phosphoric acid was applied for cleaning the composite before cementation, improving the bond strength between onlay and resin cement.^{15,16}

The self-adhesive resin cement was chosen for luting of onlay planned because it does not require pretreatment of the dental substrate, reducing postoperative sensitivity and simplifying the cementation procedure.¹⁷⁻²⁰ Also it is verified that self-adhesive luting agents seem to successfully bond to dentin-restricted as well as to enamel-restricted cavities, predicting good clinical performance.²¹ Some studies^{22,23} reveal that self-adhesive resin cement has shown a acceptable clinical behavior.

A proper evaluation, selection of techniques and materials are important points that must be observed to achieve patient's satisfaction, clinical success and longevity of indirect treatments.

CONCLUSION

Advances in adhesive dentistry methods and esthetic dental materials have enabled clinicians to perform conservative indirect restoration. The use of indirect adhesive procedures provides numerous advantages in relation to the direct restorations.

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