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Case Report

Indirect composite inlay restoration: A case report

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ABSTRACT

In several deterioration cases, composite competes with amalgams, metallic and ceramic inlays. In relatively small cavities of posterior teeth, utility of direct composite restorations is restricted due to its polymerisation stresses. A much-appreciated alternative to ceramics in posterior teeth is indirect composite. Due to recent technological advancements in composite materials and bonding techniques, its use escalates steadily. Touati and Mormann introduced the first generation of indirect resins composite in early 1980s. Although there is a successful accomplishment in direct composite restoration, the use of composite restoration with indirect or extra-oral method remains ambiguous. In this article, we will inquire into composite systems used at the laboratory for indirect restoration in a clinical ground.

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1. Introduction

Direct composite restoration causes polymerization shrinkage and it has lower fracture toughness. So we tried indirect composite restoration. Owing to the advancement of adhesive technologies and restorative materials, approaches and treatment plans for restoring posterior teeth have been impressively improved.¹ In spite of the fact that amalgam and gold have illustrated persistent clinical success and biocompatibility, novel tooth-coloured restorations are dynamically supplanting metal restorations not only for aesthetic reasons but also for more conservative preparations.² In light of biology, mechanics, function, and aesthetics, a harmonious and successful restorative result could be accomplished with these natural-looking restoration materials, such as resin composite and ceramics.³

According to various clinical performance studies, Inlays have an upper hand over direct fillings when dealing with fracture and porosity / crack formation. Comparing

with ceramic inlays, composite resin restorations have the advantage to be more user-friendly and less expensive.⁴ When compared to direct composites, indirect composite resins have an upper hand in aesthetics, colour stability and reduced postoperative sensitivity.⁵ Moreover, it is easier for indirect restorations to achieve anatomic morphology and ideal proximal contacts.

Another advantage suggested is better integrity of the tooth/restoration interface which can result in increased longevity and reduced marginal leakage.^{1,6}

Elimination of polymerization shrinkage would be a major factor in the reduction of microleakage. Three techniques have been suggested to reduce the effects of this shrinkage:

1. (Use of an incremental packing technique.
2. (The 'waxing up' of a restoration in composite in the mouth and polymerization extra orally.
3. The complete extra-oral fabrication of a composite inlay which is then placed using a resin cement.^{7,8} In addition, polymerization shrinkage, is limited to that of the thin luting cement layer, as it takes place

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extraorally.⁹

The aim of the present investigation was to study the clinical performance of composite resin inlays using the indirect inlay technique. This report presents a case involving the restoration of an extensive cavity of the upper left first premolar through an indirect composite technique and follow-up of the clinical outcome afterwards.

2. Case Presentation

A 19-year-old female student visited the department of Conservative dentistry and Endodontics, St. Gregorios Dental College, Chelad with the chief complaint of decay in the upper left back tooth region. She noticed the decay since 2 months and was asymptomatic. Clinical examination revealed Class II dental caries of the upper left first premolar without any gingival inflammation. The pulp vitality test was normal with no symptoms or signs.



Fig. 1: Preoperative photograph of maxillary left second premolar

Radiographic examination revealed an occlusal and mesial decay in proximity to the pulp horn while no obvious abnormal apical findings were noted.

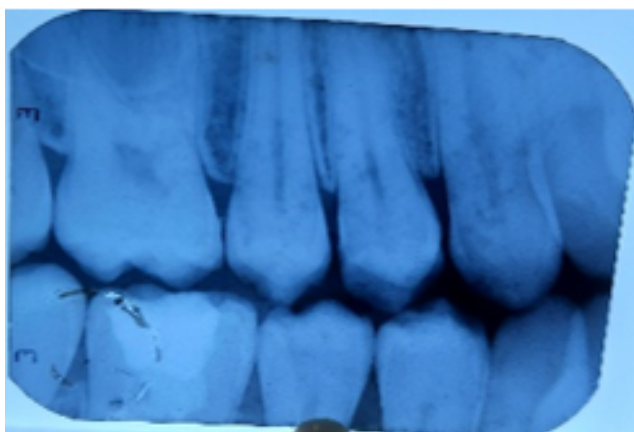


Fig. 2: Bitewing radiograph of maxillary and mandibular posteriors,

After oral hygiene reinforcement, we discussed with the patient that composite inlay might be a choice for



Fig. 3: IOPA of 24

her aesthetic and financial concerns, and further possibility of root canal treatment. A written informed consent was obtained before the treatment, and patient gave permission for the related pictures and radiographs to be published before submission.

At the next appointment, caries was removed by low-speed carbide burs and sharpened spoon excavator under rubber dam isolation. The class II cavity was prepared, bevels and flares were placed.

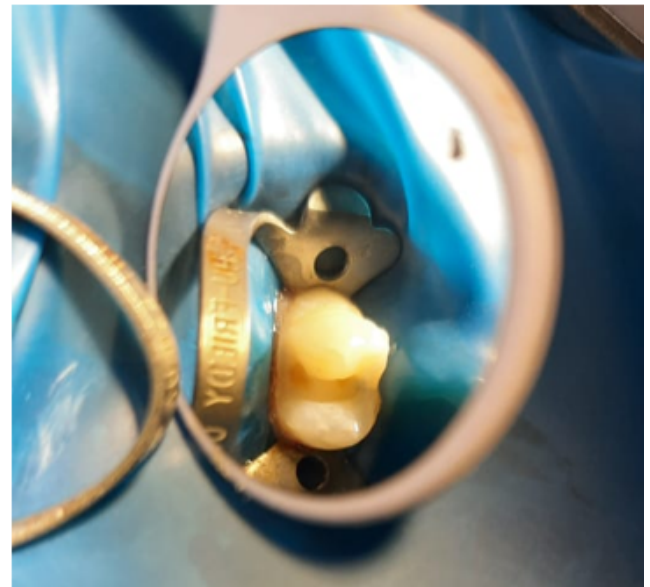


Fig. 4: Photograph of class 2 inlay cavity preparation

Light body impression material was injected onto the prepared tooth after removal of the rubber dam. Putty impression material was loaded onto the impression tray and maxillary arch impression was made.

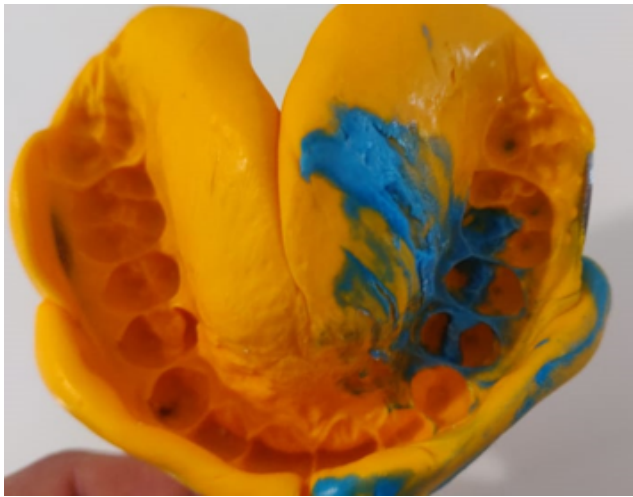


Fig. 5: Impression of prepared tooth

2.1. Laboratory procedures

A fast-setting silicone die material (GrandioSO Inlay System, Voco, Cuxhaven, Germany) was injected into the impression. Lower arch alginate impression was made and cast was poured in dental stone to check the occlusion.



Fig. 7: Shows photograph of fast-setting silicone die material (GrandioSO Inlay System, Voco, Cuxhaven, Germany).



Fig. 6:

Die material was removed carefully without any distortion and the inlay restoration was fabricated incrementally with a light-cured composite resin (shades B3) and each layer was polymerized for 20 s with a light-emitting diode curing with light irradiance of 1000 mW/cm².

For sculpting the occlusal morphology, we determined the cusps and marginal ridges by referring to the existing morphology of neighbouring teeth. In addition, the cast of the lower arch was used for adjusting the occlusion. After finishing and polymerization, the composite inlay was removed from the silicone die and cured from the intaglio surface for 40s.



Fig. 8: Shows photograph of dental impression mixing and dispenser gun.



Fig. 9: Application of separating medium on the impression of prepared tooth.



Fig. 12: Positive replica of prepared tooth and adjacent tooth



Fig. 10: Mixing of impression material



Fig. 13: Placing of composite restorative material on the prepared tooth



Fig. 11: Placing of modelling silicone onto the impression.

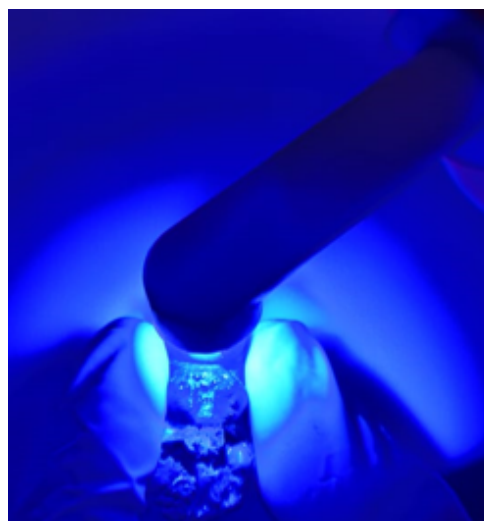


Fig. 14: Light curing of composite.



Fig. 15: Polishing of the composite restoration.



Fig. 16: Finished and polished class 2 inlay composite restoration on prepared die.

Then, the inlay was tried in and the fitness was checked. Before cementation, the intaglio surface of restoration was conditioned with 37.5% phosphoric acid gel for 15 s. After the etchant gel was rinsed, the composite inlay was rinsed with water for 15 seconds. Moreover, the tooth was selectively etched with 37.5% phosphoric acid gel for 15s, rinsed with water spray, and air dried. The self-etching adhesive and dual-cured luting composite were used for final cementation. Polymerization was performed for 20s per surface

The occlusal contacts were adjusted and checked with articulating paper. Finally, the restoration was finished by fine-grained diamond burs and polished by abrasive. At the two weeks recall, the restoration still maintained its aesthetic and chewing function.



Fig. 17: Photograph showing acid etching of the prepared class 2 inlay cavity on 24.



Fig. 18: Postoperative photograph of 24 after placement of class 2 inlay composite restoration.

3. Discussion

The resin composite inlay technique is a venture to overcome the main drawback of polymerization shrinkage of the direct resin composite restoration.¹⁰ Indirect inlays were made under dental school conditions, which is far different from a busy private practice. This should be noted in mind when evaluating the results. An indirect restoration is more complimentary for restoring the morphology and

function of a compromised tooth structure. In indirect technique an impression is taken and the composite restoration is created on a die model extraorally.³

Indirect composite resin exhibit finer stress distribution, reparability, lower cost and ease of manageability, when comparing ceramic materials.¹¹

4. Conclusion

In most of the deterioration cases, the method of indirect composite restorations is a recommended procedure and versatile solution.¹² Recent advancements in adhesive and restorative materials has proven to be effective to restore an extensively damaged posterior tooth using the indirect composite inlays.³ It offers the patients an aesthetic, durable and functional composite restoration in posterior dental arches.¹² Many of the challenging problems of the direct restoration such as polymerisation shrinkage, occlusal and anatomical discrepancies, insufficient curing can be overcome this technique.³

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Source of Funding

None.

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