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INDIRECT COMPOSITE RESTORATIONS FOR POSTERIOR TEETH: FEW CASE REPORTS

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ABSTRACT

Background: Modern restorative dentistry offers many methods of restoring the carious teeth. The advancements in adhesive dentistry have brought significant changes in the treatment of caries. Dental composite formulations have been continuously evolving ever since BISGMA was introduced to dentistry by Boven in 1962. The composite materials can be divided into direct and indirect resin composites (IRC). Indirect composite restorations are usually recommended in posterior teeth requiring large restorations.

Aim: To evaluate the restorative techniques using indirect composites as a treatment modality for grossly carious molars.

Case Description: The first case report presents 25 years old male patient with fractured restoration in maxillary right first molar. The treatment carried out included removal of faulty restoration, vitality testing, tooth preparation for composite inlay, electro-cautery on mesial aspect on the tooth involved to access the gingival floor, making the impression and fabrication and cementation of composite inlay. The second case report presents a 24 years old female patient with wide and subgingival carious lesion on palatal mesial surface of maxillary right second molar. Similar treatment as in the first case was followed, with the addition of electro-cautery on mesial aspect on the tooth involved to access the gingival floor.

Discussion: Indirect resin composites offer an aesthetic alternative for large posterior regions. These restorations are capable of reinforcing the remaining tooth structure and these are fabricated in the laboratory. The techniques described for the clinical cases here allow successful restoration of grossly carious teeth using indirect composite inlays.

Conclusion: Indirect composite inlay offers good restoration with excellent esthetics and proper interproximal contact. They can improve the deficiencies of direct composites, for example, reduction in polymerization shrinkage.

Clinical Significance: The analysis of these case reports demonstrates wide application of indirect composite restorations. This technique allows overcoming some of the limits related with direct restorations and is particularly indicated in posterior teeth.

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INTRODUCTION

The advancements in adhesive dentistry have brought significant changes in the treatment of caries (GiuseppeI, Andrea, 2008). Composite resins are used daily in clinical practice. Initially the resin composites were applied in direct restorations, but since the '80s indirect resin composites (IRCs) were also introduced in Dentistry.

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When compared to direct composites, their advantages are esthetics, color stability and reduced postoperative sensitivity. The adhesive cementation of restorations fabricated from IRCs, by means of dual curing cements, minimizes the marginal gap and compensates for the unavoidable polymerization shrinkage. Additionally, it is easier to achieve ideal proximal contacts and anatomic morphology using indirect restorations (Petropoulou, 2013). This paper presents the clinical cases in which indirect composite inlays were fabricated as contouring of direct composite restoration was difficult due to huge interproximal space resulted because of caries.

Case Description

Case 1

A 25-year-old male patient was referred to the Postgraduate Clinic of Conservative Dentistry and Endodontics (Bharati Vidyapeeth Dental College and Hospital, Pune). The patient complained of fractured restoration and gave history of Dental Amalgam restoration done 4 years back. Patient's medical history was non-contributory. Intra-oral examination revealed a fractured amalgam restoration in 16. Clinical and radiographic examination revealed secondary caries nearing pulp. The electric pulp testing for 16 was done.The pulp was vital but the remaining tooth structure was considered inadequate for a new direct resin composite filling. Hence we decided to restore the tooth with indirect composite inlay. After taking the patient's consent, it was decided to restore the tooth with indirect composite resin inlay.

First visit

Treatment- step by step procedure

After administration of anesthesia, the faulty restoration was removed. The secondary caries was excavated at slow speed using round carbide bur. The complete caries removal was ensured by caries detector dye. The unsupported and weak enamel was removed. Following the principles of tooth preparation to receive inlay, the cavity was prepared. The cavity walls were made divergent with rounded internal line angles and a butt-joint cavosurface configuration. The walls of the cavity were made smooth. As the axial wall was nearer to the pulp chamber, a protective base of glass ionomer cement was applied on the axial wall. GIC was used to block the undercuts. After final tooth preparation, the cavity was cleansed and dried. The impression was made with a polyvinylsiloxane material (Aquasil/Densply) and one step/two viscosity technique. Afterwards a direct provisional restoration was placed using temporary light cured resin based cement. The positive replica of this impression was made using die stone. Shade selection was done using Vitapan shade guide and the casts and shade prescription was sent to the laboratory for fabrication of the inlay.

Second visit

On second visit, the provisional restoration was removed and the cavity was cleansed. The cavity was acid conditioned, the adhesive was applied and light-cured on the tooth and the same adhesive was applied on the silanated internal aspect of composite inlay without being polymerized. Then the cementation was carried out by applying thin layer of resin luting cement. The resin luting cement was light-cured through the restoration from both, palatal and buccal side of restoration. The excess resin luting cement from the interproximal area was removed using a 12 number surgical blade. The finishing and polishing was done using a composite finishing kit (shofu). After final finishing and polishing, the occlusion was evaluated. The patient was informed about the limitation of the technique and was asked to maintain regular maintenance visit.

Fig1. 1. Pre-operative photograph, showing fractured amalgam restoration

Fig1. 2. Photograph showing tooth preparation and GIC liner on axial wall

Fig1. 3: Occlusal and inner surface of fabricated inlay

Fig1. 4. Inlay on the cast

Fig1. 5. Final cementation of the inlay

Case 2

A 24-year-old female patient was referred to the Postgraduate Clinic of Conservative Dentistry and Endodontics (Bharati Vidyapeeth Dental College and Hospital, Pune). The patient complained of repetitive fracture of restoration in upper right molar tooth. Upon intra-oral examination, it was observed that 16 had temporary restoration with loss of the disto-palatal cusp. The electric pulp testing for 16 was done. The pulp was vital but the remaining tooth structure was considered inadequate for a new direct resin composite filling. Hence we decided to restore the tooth with indirect composite inlay. After taking the patient's consent, it was decided to restore the tooth with indirect composite resin inlay.

First visit

Treatment- step by step procedure

After administration of anesthesia, the temporary restoration was removed. The unsupported and weak enamel was removed. Following the principles of tooth preparation to receive inlay, the cavity was prepared. The cavity walls were made divergent with rounded internal line angles and a butt-joint cavosurface configuration. The walls of the cavity were made smooth and the cavity had no undercuts. As the axial wall was nearer to the pulp chamber, a protective base of glass ionomer cement was applied on the axial wall. After final tooth preparation, the cavity was cleansed and dried. The impression was made with a polyvinylsiloxane material (Aquasil/Densply) and one step/two viscosity technique. Afterwards a direct provisional restoration was placed using temporary light cured resin based cement. The positive replica of this impression was made using die stone and the cast was sent to the laboratory for fabrication of composite inlay. Shade selection was done using Vita pan shade guide and the casts and shade prescription was sent to the laboratory for fabrication of the inlay.

Second visit

On second visit, the provisional restoration was removed and the cavity was cleansed. The cavity was acid conditioned, the adhesive was applied and light-cured on the tooth and the same adhesive was applied on the silanated internal aspect of composite inlay without being polymerized. Then the cementation was carried out by applying thin layer of resin luting cement. The resin luting cement was light-cured through the restoration from both, palatal and buccal side of restoration. The excess resin luting cement from the interproximal area was removed using a 12 number surgical blade. The finishing and polishing was done using a composite finishing kit (shofu). After final finishing and polishing, the occlusion was evaluated. The patient was informed about the limitation of the technique and was asked to maintain regular maintenance visit.

Fig. 2. 1. Pre-operative photograph

Fig. 2. 2. Tooth Preparation and GIC lining done

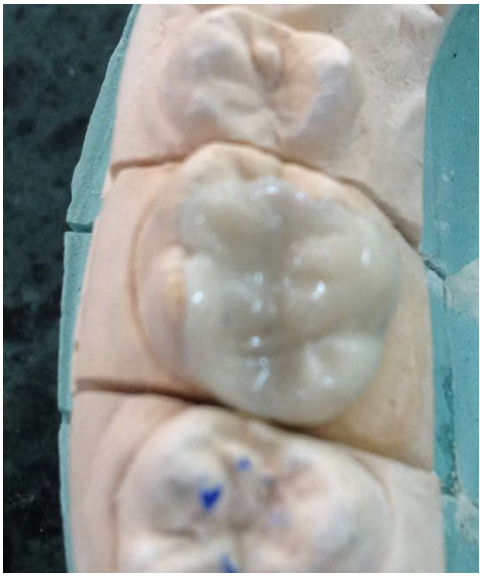

Fig 2. 3. Inlay fabricated

Fig. 2. 4. Inlay cementation done

DISCUSSION

Composite resins are used daily in clinical practice. Initially the resin composites were applied in direct restorations, but since the '80sindirect resin composites (IRCs) were also introduced in Dentistry.[3]The composition of indirect composite resin systems is similar to that of direct systems, differing by the use of different methods of additional polymerization, which allows a higher radical conversion. These additional polymerization procedures can involve photo-activation, heat, pressure, and a nitrogenatmosphere.[4] Several studies were initiated to assess the clinical performance of IRCs. Compared to ceramic materials, IRCs exhibit better stress distribution, reparability, lower cost and ease of handling (Soares *et al*., 2007). On the other hand, they show inferior long term surface characteristics, such as surface roughness and esthetics and they are more prone to color changes (Nandini, 2010; Hirata *et al*., 2011). When compared to direct composites, their advantages are esthetics, color stability and reduced postoperativesensitivity (Petropoulou, 2013). The adhesive cementation of restorations fabricated from IRCs, by means of dual curing cements, minimizes the marginal gap and compensates for the unavoidable polymerization shrinkage. Additionally, it is easier to achieve ideal proximal contacts and anatomic morphology using indirect restorations (Soares *et al*., 2007). An important advantage of using this indirect restoration method is increased resistance to compression, increased surface hardness and reduced risk of fractures and cracks in the internal structure of the material (Renata Chałas, 2014). A positive feature of the indirect restorations is the possibility of extra-oral working. It allows for obtaining a high degree of surface smoothness. Composite inlays additionally allow for precisely-contoured restoration of tooth structure, such as points of contact, or the correct anatomical form of the occlusal surface of molars and premolars. The exact restoration of the walls and occlusal surface in aesthetic terms, it is not possible with the direct technique (Renata Chałas *et al*., 2014). Based on their characteristics, IRCs cover nowadays a wide range of indications, including inlays, on lays, overlays and as a repair material for a variety of restorations.[2] Indications for performing indirect composite restorations are primarily situations where it is possible to use the remaining dental hard tissues, while there is such a level of degradation that the classical composite reconstruction would fail to meet its basic functional and aesthetic performance. The use of the indirect method is indicated in the following situations (Renata Chałas, 2014).

- Thin mined side walls,
- Destruction of at least one cusp of the tooth,
- Cavities exceeding the dimension of 1/3 to 1/2 of the distance between the peaks of cusps
- Difficult to restore points of contact,
- Teeth after endodontic treatment, with good quality of the remaining hard tissues,
- Cavities located above the gingiva.

Conclusion

It can be concluded that the method of indirect composite restorations is a recommended procedure and versatile solution in many difficult situations. It is a good alternative to direct composite restorations. With the indirect method, we can offer patients an aesthetic and, above all, durable and functional composite restoration in posterior dental arches.

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