

## Clinical Evaluation Of Aesthetic Composite Inlay Restoration: A Case Report

Ruchi Gupta<sup>1</sup>, Anil K Tomer<sup>2</sup>, S. Parvathi Jayan<sup>3</sup>

*Professor, Dept of Conservative Dentistry and Endodontics, Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad*

*Professor and Head, Dept of Conservative Dentistry and Endodontics, Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad*

*PG Student, Dept of Conservative Dentistry and Endodontics, Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad*

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### Abstract

The restoration of severely damaged teeth can be a real challenge for dentists who follow the rules of the contemporary conservative dentistry and preserve as much tooth structure as possible. The provision of inlays and onlays are a unique ally in this effort. Indirect partial coverage restorations are considered to be a conservative substitute for crowns. Advances in adhesive technologies and escalation in aesthetic demands have increased indications for tooth-coloured, partial coverage restorations. Partial indirect restorations classified as inlay and onlay enable conservation of the remaining dental structure, promoting reinforcement of a tooth compromised by caries or fractures. This case report is an attempt to enlighten the restoration of a carious tooth with aesthetic indirect composite restoration.

**Key words:** Esthetics, Composite, Inlay, Resin cement, Indirect curing, Restoration

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### I. Introduction

For many decades gold and amalgam were the only available materials for the restoration of carious teeth but the demand for more aesthetic options led to the use of porcelain and composite resins in dentistry. Nowadays the restoration of severely damaged teeth can be a real challenge for dentists who want to follow the rules of the contemporary conservative dentistry and preserve as much tooth structure as possible. The provision of inlays and onlays are a unique ally in this effort.

Indirect partial coverage restorations are considered to be a conservative substitute for crowns. They are used when the coronal part of the tooth is massively damaged and the remaining dentin thickness is too weak to support direct restoration. They enable conservation of the remaining tooth structure and strengthen a compromised tooth with caries or a fracture.<sup>1</sup>

Materials used for inlays are tooth colored restorations: Composites & Ceramics, Cast Metals : Type I & II gold alloys and low gold alloys. Advances in adhesive technologies and escalation in aesthetic demands have increased indications for tooth-coloured, partial coverage restorations. Partial indirect restorations classified as inlays (including capping of one or more cusps but not all the cusps), onlays (covering all cusps) enable conservation of the remaining dental structure, promoting reinforcement of a tooth compromised by caries or fractures. Numerous resin or ceramic materials are currently available for fabricating indirect partial restorations and mechanical strength is important for their durability in posterior applications.<sup>2</sup> The ultimate strength of laboratory-processed resin composites depends on the degree of conversion of monomers (organic phase) and the quantity of the inorganic phase. Fabrication of these composites is based on chemical, heat, or photopolymerization methods or milling procedures from prefabricated computer aided design/computer aided manufacturing (CAD/CAM) blocks. Partial-coverage reconstructions could also be made of feldspathic porcelain, glass or crystalline ceramics. Feldspathic porcelain and glass-ceramics, available in powder (stratification) or blocks (CAD/CAM), comprise a vitreous and crystalline phase, in which a glassy matrix could be etched.<sup>3</sup>

To overcome the clinical disadvantages of composite posterior restorations such as fractures, loss of material and marginal deficiencies followed by secondary caries various inlay techniques have been developed. The inlays can be made using either an indirect or a direct technique and the inlay material can be either resin composite or ceramic.

## **II. Case Report**

A patient came with the chief complaint of food lodgement and sensitivity in upper right first premolar. His teeth were in occlusion. The involved tooth was weakened. There was no fracture or failure of previous direct restoration. The tooth was not requiring cuspal coverage. There was difficulty in achieving good contour, contact point or occlusion using direct restorations. The patient was having good oral hygiene with no heavy bruxism habits or periodontal problems. So treatment planning was done to place an aesthetic indirect inlay restoration. In ideal clinical circumstances, preparation margins were conveniently positioned. Decay, existing restorations and the presence of fractures determined the final shape of a preparation. The tooth preparation was done with high speed arotor. Outline of the cavity was determined by the caries lesion or the size of the restoration to be replaced. Caries excavation was done by round burs at low speed and/or manually with hand instruments. After tooth preparation, separating medium was applied onto the tooth and composite EverX Posterior Composite(GC) was placed on to the prepared cavity. After that the composite was cured and removed from the cavity. It was then placed in the indirect curing unit Indirect Curing Unit(Song Young International Co) and cured. It was then cemented on the prepared tooth surface. Occlusion was carefully adjusted with articulating paper. After finishing, polishing was done. The restorations were evaluated postoperatively. The restoration was evaluated according to the following characteristics: marginal adaptation, post-operative sensitivity, colour match, anatomic form, surface roughness, marginal staining, occlusal contacts and secondary caries. The patient was asymptomatic at recall.

## **III. Discussion**

Composite resin or ceramic inlays are used for restoration of extensive MOD cavities in posterior teeth. Composite resins are characterized by mechanical properties similar to dentin. Their elastic modulus, ultimate compressive strength, and hardness depend on the volume of filler in the restorative material.<sup>4</sup> Composite resins used for indirect and direct restorations exhibit similar flexural strength, flexural modulus, and hardness. Indirect inlays are adhesively bonded to teeth using resin cements which have a higher bond strength to tissue compared to other luting agents, such as zinc phosphate and glass-ionomer cements. Strong, complete bonding of the inlay to tissue potentially results in an increase in tooth fracture resistance. Ceramic inlays are primarily composed of leucite-reinforced ceramics. This material is characterized by an elastic modulus similar to enamel. Ceramic inlays maintain better anatomic form of the surface and exhibit better marginal integrity, as well as stabilize the weakened cusps better than composite resin inlays.<sup>5</sup>

Resin composites come in different compositions, filler shapes and matrix specifications. Laboratory composite resins are very similar to direct composite resins in terms of composition but the extraoral curing by heat, pressure or light seems to improve their physical and mechanical strength. It can be used where the dimension of the cavity does not allow the application of a direct technique, also can be used in the large mass of restoration by the direct technique is not indicated due to the significant shrinkage of the polymerization and the stress at the cavity walls. In case of Multiple restorations by quadrant, composite inlays are easier technique because it requires a single impression avoiding multiple sessions. The patient must have good oral hygiene, to avoid any risk of percolation at the joint, knowing that it is a bonded inlay. The tooth must be vital as it is uncertain to indicate this technique on a tooth with a pulpal disorder. In the case of endodontically treated teeth, other therapeutic methods must be used. In bruxism cases, the composite remains the restoration material of choice. Its low hardness compared to the dental structures makes the wear caused by the bruxism takes place at the composite reconstitution and not at the antagonist tooth. Unlike what happens with other materials such as ceramics Ceramic indirect restorations were first introduced in the late 1880s, but due to difficulties in construction and high failure rates, they did not become commonly used. The introduction of dental CAD/CAM technology and improvements in physical properties of ceramics have led to indirect restorations being fabricated from new materials such as leucite ceramics, lithium-silicate or lithium-disilicate ceramics, zirconia, and the newly developed resin-matrix ceramics. These materials differ from each other in terms of their structure, composition, and properties.

Some of the major advantages of composite inlays against ceramic and gold inlays are: Aesthetic appearance especially if this is combined with various shades and multiple translucencies (Layering technique) can be equal or superior to porcelain. It is repairable, easy to maintain and refurbish (Can be modified by adding new material to old). Composite inlays are low cost compared to porcelain and gold alloys. Bonding to dental tissue is better compared to gold. They have minimal wear to occluding enamel compared to porcelain. Also they can be constructed either in the lab or chairside (indirect, semi-direct technique or even direct and recurred extraorally). They are easily polishable outside or inside mouth. Composite inlays have similar mechanical properties to dentine compared to ceramic.<sup>6</sup> Their ability to absorb forces make them an ideal restoration for cracked teeth. Some disadvantages of composite inlay include inferior longevity compared to ceramics and amalgams, Lower strength especially when used in limited space restorations compared to gold. Colour is changing during time, possible release of toxic substances, Microleakage & Secondary caries.

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