

## Conservative dentistry

Lec. 4

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### Indirect esthetic restoration of posterior teeth

Indirect esthetic restoration of posterior teeth (Inlay and onlay) are methods of restoring relatively extensive tooth decay or damage without having to replace the whole outer enamel of the tooth as with a crown. Less tooth structure is removed so inlays and onlays tend to be more conservative and esthetic than crowns. In spite of the fact that simplicity of restorative dentistry dictates direct approach including cavity preparation and immediate restoration of any tooth defect. Yet, in some cases indirect restoration may be the only successful resort for restoration.

#### **General indications for indirect esthetic restoration of posterior teeth:**

- 1- Extensively damaged teeth: where the direct restorations cannot solve the problems of restoring proper contour, contact and occlusion.
- 2- Unco-operative patient: wise management of such patients requires minimizing chair side time by taking an accurate impression and completing most of the restorative steps outside the patient's mouth.
- 3- Deeply seated subgingival cavities where proper finishing and polishing of direct restorations is difficult if not impossible.
- 4- Solving of occlusal problems such as attrition with decreased vertical dimension and collapsed lower third of the face may cause temporomandibular joint troubles.
- 5- Correction of esthetic defect, such as excessive discoloration caused by fluorosis, peg lateral incisors, and tetracycline stains when it is difficult to be removed by other esthetic alternatives.
- 6- Lack of accessibility.

#### **Contraindications of Indirect esthetic restoration of posterior teeth:**

- 1- Poor oral hygiene.
- 2- Excessive tooth wear.
- 3- Impossible moisture isolation.
- 4- Insufficient tooth structure available for bonding.

#### **Cavity preparation for esthetic inlays:**

The following must be taken into Consideration:

- 1-The final preparation does not need extension further than initial defect.
- 2- Elimination (blocking) of cavity undercuts only.
- 3-The key for successful indirect restorations is forming a reliable bond between an adhesives resin and the indirect restoration.
- 4-A butt-joint cavo- surface margins.
- 5-Sharp internal line angles must be avoided.
- 6-The importance of contact clearance with inlay preparations are to allow easy penetration of the impression material between the cavity margin and the neighboring tooth otherwise it will be impossible to separate the die from the cast stone For better convenience.

### **Indirect composite restoration of posterior teeth:**

This type of composite restoration was introduced to overcome the disadvantages of direct composite restoration. The restoration are fabricated outside patient's mouth, on replica of the prepared tooth by technician, generating dense, well cured restorations by using devices that polymerize the composite under pressure, vacuum, inert gas, intense light, heat, or combination of these conditions. In addition to general indications for indirect restorations the following conditions should be present:

- 1- Good standard of oral hygiene.
- 2-Cavities free from marked undercuts.
- 3- Sufficient tooth structure available for bonding.
- 4-Occlusal load must not exceed the flexural strength of the restoration/tooth complex.
- 5- The tooth must not show evidence of excessive wear.
- 6- Ideally, the cavity margins must be placed in enamel.

Composite resin inlays were developed to overcome some of the problems encountered by clinicians during fabrication of direct composite resin in posterior teeth, Including:

- 1-Marginal leakage,
- 2- Increased wear.
- 3- Improper restoration contour at the contact area because of the inaccessible areas.

### **Advantages**

- 1-More bio- combatable Due to Less residual monomer. Less heat transition to the

pulp, less eye hazards

2-Improved physical properties.

3- Less micro leakage.

4-The ability to restore the contact, contour and occlusion apart from the restricted inaccessible oral cavity.

5- Less chair side time

### **Disadvantages:**

1- Unfortunately no clinical data support the manufacturer claim that post- curing improves the wear characteristics of the material.

2-Failure of bonding of composite cement to the fitting surface.

3- Roughening of the inlay fitting surface with diamond burs or Sand blasting with SiO<sub>2</sub> powder are suggested means for enhancement of the bond at the composite resin inlay/resin cement interface.

4- Additional time and skill is needed as compared to direct insertion procedure.

5-These restorations are more expensive for the patient.

### **Techniques for fabrication of composite resin inlays:**

Two different fabrication techniques:

- I. Combined direct/indirect (semidirect) technique,(in-office)
  - A-semi-direct intra oral technique.
  - B-Semi-direct extra oral technique. (flexible model technique)
- II. The indirect technique on stone die (in-office or in laboratory)

### **Inlays**

Inlays are usually used when difficulty is anticipated or experienced in obtaining an acceptable contour, contact point and occlusion on a directly placed restoration. Repeated fracture of a directly placed restoration may also indicate the placement of an inlay.



### **Onlays**

The most commonly placed partial coverage extracoronal restoration would be an onlay where weakened tooth structure can be protected without further extensive tooth removal. A common indication for an onlay would be a root-filled posterior tooth where cuspal protection is required.

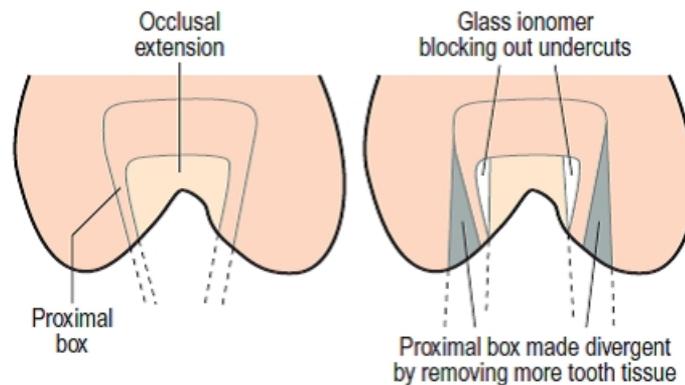
The coronal access cavity needed for a root treatment removes the roof of the pulp chamber, weakening the tooth further, and can leave a limited amount of buccal and lingual tooth tissue which might be completely removed if prepared for a crown. Preservation of some part of the buccal and lingual tooth helps to retain the core and reduces the need to consider a post.



## TOOTH PREPARATION FOR INLAYS AND ONLAYS

Tooth preparation for intra- and extra-coronal restorations follows the same basic concepts as used for all indirect restorations. The preparation should avoid undercuts between opposing walls within the cavity; however, the more complex the shape, the harder it is to avoid them. Multiple surface intracoronal restorations, particularly those including proximal boxes, are particularly demanding and, as a result, cavities tend to be overtapered. Since all-ceramic restorations rely upon the cement lute for most of the retention, provided there are no undercuts a slightly over-tapered cavity is acceptable. The major advantage for inlay and onlay restorations is the preservation of some tooth tissue to retain the core. If existing cavities contain undercuts they can be blocked out with composite or glass ionomer cements to provide the necessary cavity shape. Tapered burs provide the most convenient shape to prepare inlays and

onlays and reduce the chance of creating undercuts. If an onlay preparation is to be cut, occlusal clearance/reduction will be required consistent with the material chosen. Similarly, the marginal configuration (shoulder, chamfer or deep chamfer) will also be dictated by the material planned.



Diagrammatic representation of an undercut Class II cavity which has been prepared for an amalgam restoration (left). To convert this to an inlay preparation, the undercuts have to be eliminated. This can be achieved either by blocking out the undercuts with an adhesive restorative material or by removing more tooth tissue to produce a divergent cavity (right).

## 2-Provisionalization:

The aim of temporarization is to:

- Protect the pulpo-dentinal complex from any bacterial, mechanical, and thermal aggression,
- Stabilize relations with proximal and antagonist teeth,
- Maintain an acceptable function. It should not stay more than a week of impression taking.

## Computer aided design/ Computer aided manufacturing (CAD/CAM) system for indirect composite restorations:

(CAD\CAM) system are expensive laboratory work. The chairside (CAD\CAM) restoration begins after the dentist prepares the tooth and uses a scanning device to collect information about the shape of the preparation and its relationship with surrounding

structures ( this step called optical impression ).The system projects an image of the prepared tooth and surrounding structure on a monitor which allowing the dentist to

design the restoration, after the restoration has been design, the computer direct a milling device (CAM portion of the system ) that mills the restoration out of a block of composite in minutes , the restoration is removed from milling device and is ready for try in for any needed adjustment, then bonding the restoration in the tooth cavity and polishing will be performed.