CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.2545628

Available online at: http://www.iajps.com ***Review Article***

COMPOSITE: INLAY AND ONLAY

Sharifah sulaiman alzaidi[1], Anan Abdulhamid Alandanousi[2], Afnan hashim niaz[2], Hani Bakheet Alsaadi[2], Abdullah khalid Alghamdi[2], Amro awad alamri[3], Dimah Ali Faydhi[3], Alshaymaa Ali Faydhi[4]

[1]King Salman Armed Forces Hospital, [2]Alhada Armed Forces Hospital, [3]King Abdulaziz Universality, [4]Ibn sina National College

Abstract:

Introduction: *The development of composite resin restoration as an alternative to full metal crown, ceramic and amalgam restoration for extensively broken teeth has led to an increasing interest among dentist. Posterior indirect composite restoration is both aesthetic and less destructive to remaining tooth structure. Thus, an indirectly fabricated resin composite restoration provides a viable as well as cost-effective treatment.*

The aim of work: *The study aims to understand the restorative procedure used for extensively damaged posterior teeth using composite inlay and only*

Methodology: *The review is comprehensive research of PUBMED from the year 1983 to 2015*

Conclusion: *The advent of bonding systems and the use of the etching capabilities of enamel and dentine have considerably modified the therapeutic concept of posterior dental lesions. Modern restorative dentistry is substantially adhesive. The conservative spirit should pervade all procedures. Preserving healthy tissue (not only dental but also pulpal and periodontal) has become the priority. With this approach, indirect adhesive restorations are indicated in large cavities associated with cuspal coverage with absent or reduced amounts of cervical enamel*

Keywords: *Indirect resin restoration, composite inlay, composite only.*

Corresponding author:

Sharifah sulaiman alzaidi,

King Salman Armed Forces Hospital,

Email: Dr.sharifahsulaiman@gmail.com,

Mobile: 0555689290.

QR code

Please cite this article in press Sharifah sulaiman alzaidi et al., ***Composite: Inlay and Onlay.,*** *Indo Am. J. P. Sci, 2019; 06(01).*

INTRODUCTION:

INDIRECT POSTERIOR RESTORATION: COMPOSITE INLAY

The therapeutic concept in restoring posterior lesions has changed over a period time with the advent of bonding system and use of etching capabilities of enamel and dentine. Touati and James in 1983 were first to propose the molded composite incrustations, made from an impression and secondarily bonded in the mouth. Composite inlays were earlier termed as composite incrustations. [1,2]

PRINCIPLE:

The basic principle is creating a well-adapted, functional and aesthetic composite restoration using a manufactured extemporaneously, comes from the impression of cavity preparation. [1-3]

INDICATIONS: [4,5]

- The dimension of the cavity due to extensively lost tooth structure does not allow the application of direct technique, the large mass of restoration if used leads to significant polymerization shrinkage and stress at cavity walls.
- Multiple restoration by quadrant because it requires a single impression avoiding multiple patient visit.
- When patient demands aesthetic results since there is a variety of shades associated with layering technique which allows proper reproduction of original dental structure.
- Good oral hygiene, patient's good oral hygiene avoids any risk of percolation at the joint.
- Vital tooth, the tooth must be vital since the outcome of this technique is uncertain on a tooth with pulpal disorder.
- In case of bruxism, composite remains the choice of restoration since it has low hardness compare to dental structures and makes the wear takes place at composite reconstitution and not the antagonist tooth unlike other restorative material such as ceramics.

CLINICAL STEPS AND PROCEDURES:

The clinical procedure in composite inlay begins with a complete clinical examination of the tooth using vitality tests. The tooth must be vital and without any pulpal involvement. After a complete examination, the carious lesions is eliminated with maximum preservation of healthy tissue.

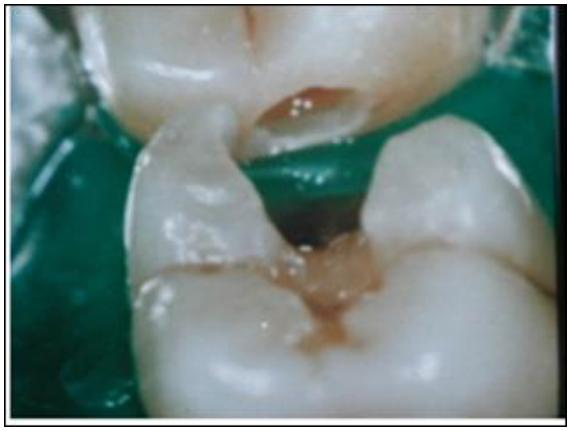


Figure showing the cavity preparation. [6]

The clinical steps require greater concentration, application, reasoned dental preparation and precise impression and coordination with laboratory. While preparing cavity the occlusion impact points should be taken care of, that the future restoration/tooth joint does not coincide with this as these contacts can cause deterioration of joint with percolation, marginal staining, hiatus formation, and secondary caries.

The dental dam is imperative to isolate the operative field for dry and aseptic operating environment. The preparation for composite inlay is same as of fixed prosthodontics. Dentinal substitute materials such as Glass-ionomer cement or flowable composite are used to fill the dentinal undercuts

The impression is made in single-step with the dual-vicosity technique using silicone material and is sent to a laboratory for casting procedure. The prepared cavity is protected using temporary filling material. [7-9]

Figure showing (A) Impression made with silicone (B) Temporary filling of the prepared cavity (C) Composite indirect build-up. [6]

The Post-Lab procedure of the inlay is treated following these steps:

- Post-light-curing with heat and light at 80-140 °, the final cooking phase improves the mechanical properties, marginal integrity, and surface topography.
- The inlay is then tried the tooth under dam isolation since exposure to mouth fluids will cause readmission of inlay to resume sanding and etching treatments. During this step, functional and margins adjustment are done if necessary.
- Cavity prepared on tooth surface is treated with enamel and dentin etching during 20 seconds, 20 seconds rinsing, drying and application bonding system (4^{th} or 5^{th} generation)
- The treatment to tooth surface allows with etchant and bonding agent cause micro-locking in enamel and hybrid layer in dentin by tangling between adhesive system and dentin collagen matrix thus allows the adhesion of composite. Matrix system is used in proximal cavities to avoid cervical excess.
- Bonding proceeds with dual flow composites, chemical and light cured. First the composite is placed in cavity followed by inlay with light pressure.
- All the excess material is removed using the probe on occlusal surfaces and dental floss on proximal surfaces before polymerization
- The final step includes polymerization of tooth walls, polishing and finishing using diamond burs and disks

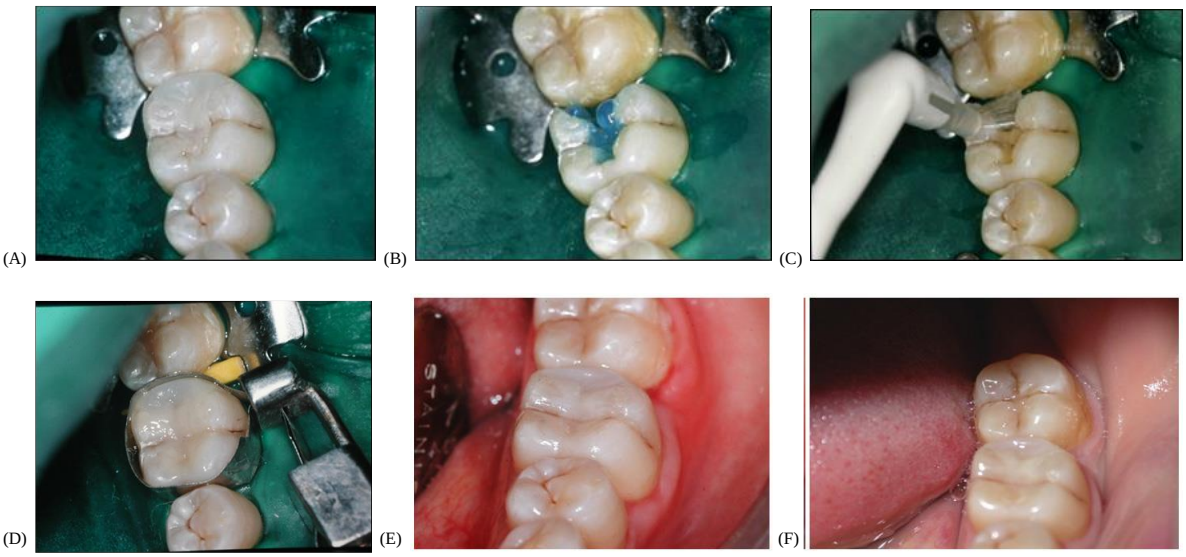


Figure showing (A) Try in of inlay composite (B, C) Etching and bonding treatment of prepared cavity (D) Use of matrix system in proximal cavity (E, F) Final result after inlay sealing. [6]

INDIRECT POSTERIOR RESTORATION: COMPOSITE ONLAY

An indirect Onlay composite restoration is considered when three-walled cavity defect greater than one-half to two-thirds of intercuspal width is present. It can be due to tooth fracture, extensive carious damage, and removal of the previous restoration. The composite only can be used in such defects with certain clinical criteria as follow: [10]

INDICATIONS: [10]

- The margins should be supragingival for predictable bonding
- Patient must have a satisfactory oral hygiene and disease control measures.
- A minimum of 1.5-2.0mm occlusal thickness is present for interocclusal space.
- The tooth must be endodontically treated with appropriate coronal seal
- The tooth should be effectively isolated for cementation.
- The presence of posterior disclusion in excursive movements; when only axial loading takes place, increased interfacial stresses resultant from lateral and horizontal forces are avoided
- Presence of occlusal habits such as bruxism is relatively contraindicated.

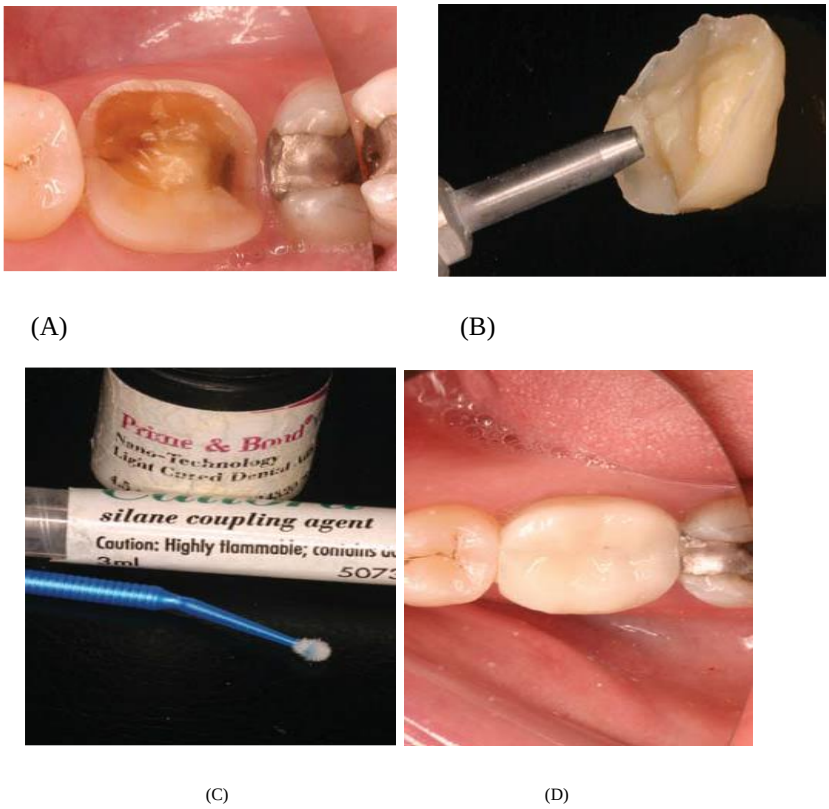
Figure showing Three-walled defect ideal for Onlay [10]

CLINICAL STEPS AND PROCEDURE: [10]

- All cavity margins prepared to 90 º butt joint and are finished using discs. To ensure that remaining axial tooth walls diverged occlusally without undercut, all the internal line angles were rounded and smoothed. The remaining coronal tooth structure is utilized to optimize the features which were present previously. Proximal boxes increase resistance and retention form.
- Post cavity preparation, a full arch impression is made using elastomeric material, and the opposing arch is recorded using alginate material.
- In certain cases where teeth were heavily restored before leads to secondary dentine formation cause reduced or absent sensitivity. Bacterial contamination and thermal sensitivity of exposed dentine can be eliminated using dentine sealing and placement of appropriate base material such as GIC or flowable composite. [11]
- Following dentine sealing, a thin layer of glycerin gel is applied, and provisional soft resin-based material can be placed without cementation. A silicone index is made for fabrication of interim restoration by building up tooth contour in the mouth.
- A layer of bonding resin is applied to preparation, followed by placement of matrix filled with auto-polymerizing resin material and removal of excess flash.
- In the laboratory, the impression is poured in type IV stone with 0.3mm die spacer followed by composite resin build-up to contour and cured in polymerization unit.
- The post-laboratory procedure the only has

been tried regarding the accuracy of seating, the marginal fit is verified, and occlusion is checked and adjusted before luting.

- Both the fir surface of the tooth and only is air abraded using 50µm aluminum oxide with operative field isolated using rubber dam and further cleaned with spirit.
- It is advisable to use retraction cord in case of margins located near gingival; this is to ensure optimal moisture control. The silanating agent is applied on onlay surface.
- The restoration is finally seated with light finger pressure initially and maintained later with the ball burnisher held against central fossa until the set had taken place.
- Excess of cement is removed proximally while it's still in its rubbery stage using dental floss. [12]



(A) (B)

(C) (D)

Figure showing (A) Prepared cavity (B) air abrasion using aluminum oxide on onlay surface (C) Silane coupling agent to be applied on onlay surface (D) Final restoration post luting. [10]

CONCLUSION:

Earlier in restorative dentistry, metallic inlays and especially gold were considered as the choice of filling material for posteriors. But with increased aesthetic demands, inlay and onlay came to consideration hence reproducing natural appearance as well promoting healthy treatment outcome. Composite onlay as well have potential to offer a viable restorative treatment with as much as tooth preservation and remaining tooth structure protection. Thus, compare to the full metallic crown, an acceptably predictable and cost-effective aesthetic restoration can be given for severely damaged posterior teeth.

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