

Replacement of Defective Restorations in Posterior Teeth: An Inlay Case Series

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Abstract

The restoration of severely damaged teeth can be a real challenge for dental practitioners to follow the rules of contemporary conservative dentistry and preserve as much tooth structure as possible. Inlays are a type of indirect restoration that is used to restore extensively damaged or decayed teeth. Inlays are an alternative to a direct restoration which is used to fill cavities and are made up of metal, amalgam, composite, and ceramic and then cemented onto the tooth surface to make the tooth in proper functioning.

Key words: Ceramic inlay, Indirect composite inlay, Metal inlay, Posterior restoration, Resin cement

INTRODUCTION

An ideal restoration has required the development of several restorative techniques and materials. Although metallic alloys were used due to their favorable biomechanical properties, to enhance the development of materials with better performance to accomplish clinical requirements and meet the patient's esthetic expectations.^[1]

Although amalgam and gold have illustrated persistent clinical success and biocompatibility, novel tooth-colored restorations provide an esthetic appearance and preserve the sound tooth structure.^[2] Nowadays, composite materials and non-metallic ceramic restorations are most commonly used.^[1]

According to Jose *et al.*, the first generation of an indirect resin composite was used in the early 1980s. Although there is a successful accomplishment in a direct composite restoration, using composite restoration with indirect or extra-oral methods remains obscure.^[2]

Ceramic materials have relatively high compressive strength, low flexural strength, and fracture toughness, but the

limitation is the brittleness of this material and the high potential of wearing the enamel or resin restoration of the antagonist's teeth. Nowadays, ceramic compositions have added an abrading potential of dental enamel which appears as natural teeth, which have less aggressive behavior.^[1]

There are certain indications and contraindications of indirect inlay;

INDICATIONS

- Large restorations
- Faulty restorations or repeated fracture
- Restorations within the body of the tooth that does not require cuspal coverage
- Difficulty in achieving good contact and contour or occlusion using direct restorations.^[3]

CONTRAINDICATIONS

- Poor oral hygiene
- Parafunctional habits and heavy occlusal forces
- Developing deciduous teeth
- Extensive caries^[4]

ADVANTAGES OF INLAYS

These are the indirect restoration that is used to restore extensively damaged or carious teeth when compared to direct restorations.

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www.ijss-sn.com

Month of Submission : 04-2023
Month of Peer Review : 05-2023
Month of Acceptance : 06-2023
Month of Publishing : 06-2023

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- Strong and durable

Provides natural tooth appearance:

- For example., ceramic inlays have excellent esthetic and are almost indistinguishable from the surrounding sound tooth
- Ceramic inlays have better physical properties than composite restorations^[5]
- Aim to achieve better contact and contours because they are custom-made and fabricated in the laboratory^[4]
- Less microleakage and less post-operative sensitivity than direct resin composite fillings.^[6]

DISADVANTAGES

- Higher cost, due to the need for a dental laboratory
- Lengthier process as two appointments are required i.e., increased chair time for the patient
- Marginal leakage and staining
- Technique sensitive.^[7]

Despite all these advantages, the longevity and success of this type of restoration depend on the correct indication, the clinical experience of the operator, and the accurate work of the laboratory technician.^[1] The aim of this case report is to restore the faulty restoration with indirect restoration to make the tooth functional by conserving the intact facial and lingual enamel and maintaining the healthy periodontium and thus prolonging the longevity of the restoration.

CLINICAL PROCEDURE

Case-1

A 21-year-old female patient reported to the department of conservative dentistry and endodontics with the chief complaint of food lodgment in the left lower back region of mouth for the past 1 month. The medical history was not significant. The patient had undergone restoration irt 36. On clinical examination, there was a faulty restoration in irt 36 [Figure 1a]. The pulp vitality test with cold test (Roeko Endo-Frost, Coltene) showed a normal response, and on electric pulp, testing (Waldent) showed a positive response. On radiographic examination, fractured restoration with proximal caries irt 36 was seen [Figure 1b]. The final diagnosis of reversible pulpitis irt 36 was made.

The final treatment plan was indirect composite inlay irt 36. All the procedures were explained to the patient and written informed consent was taken.

In the first appointment

The faulty restoration was removed, and cavity preparation

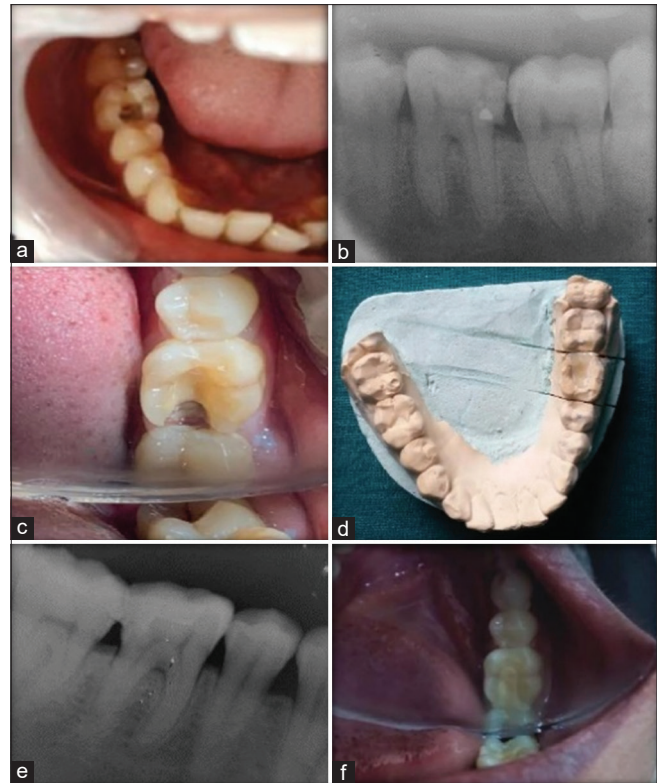


Figure 1: (a) Pre-operative picture (b) pre-operative radiograph (c) cavity preparation (d) cast (e) post-operative radiograph (f) post-operative picture

was done for inlay restoration [Figure 1c] with no sharp angles; slightly flared walls of 8°–10° and a minimum preparation depth of 1.5 mm. After cavity preparation, the impression was made using a polyvinyl silicone material, cast was made [Figure 1d] and shade selection was done.

In the second appointment

The inlay was placed on the prepared tooth surface, and the contact points were checked. The tooth surface was etched for 20 s, rinse and dried, and apply the bonding system. Pre-treatment of restoration was done by sandblasting. The treatment of tooth surface allows with etchant and bonding agent which cause microlocking in enamel and hybrid layer in dentin by tangling between adhesive system and dentin collagen matrix thus allowing the adhesion of composite. A thin layer of dual-cure composite resin (Sirona, Dentsply) was applied to the inner surface of the restoration. After that inlay was placed in the prepared cavity and excess material is removed with the probe, occlusion was checked and flossing was done on proximal surfaces before polymerization. The final step includes the polymerization of tooth walls for 60 s, polishing, and finishing using diamond burs and disks, and a radiograph was taken [Figure 1e and f].

Case-2

A 28-year-old female patient reported to the department of conservative dentistry and endodontics with the chief

complaint of dislodged restoration in the left lower back region of the mouth for the past 2 months. The medical history was not significant. The patient had undergone restoration irt 36. On clinical examination, there was a faulty restoration in irt 36 [Figure 2a]. The pulp vitality test with cold test (Roeko Endo-Frost, Coltene) showed a normal response, and on electric pulp, testing (Waldent) showed a positive response. On radiographic examination, fractured restoration with proximal caries Irt 36 was seen [Figure 2b]. The final diagnosis of reversible pulpitis irt 36 was made. The final treatment plan was metal inlay irt 36. All the procedures were explained to the patient and written informed consent was taken.

The initial old restoration was removed and inlay cavity preparation was made [Figure 2c] which extended 1mm into dentin at the central fossa. For inlay cavity preparation, the pulpal floor should be flat over most of its extent. Moreover, the pulpal depth should be 1–1.5 mm from the DEJ. Burs 169 L were used for giving 3°–5° divergence and bur no. 8862 for giving bevels. After cavity preparation, the impression was made using polyvinyl silicone material, and a cast was made [Figure 2d].

The inlay is tried in [Figure 2e] and cementation was done as discussed earlier. Post-operative radiograph was taken [Figure 2f].

Case-3

A 30-year-old female patient reported to the department of conservative dentistry and endodontics with the chief complaint of dislodged restoration in the left lower back region of the mouth for the past 1 month. The medical history was not significant. The patient had undergone restoration irt 36. On clinical examination, there was a faulty restoration in irt 36. The pulp vitality test with cold test (Roeko Endo-Frost, Coltene) showed a normal response, and electric pulp testing (Waldent) showed a positive response. On radiographic examination, fractured restoration with proximal caries Irt 36 was seen [Figure 3a]. The final diagnosis of reversible pulpitis irt 36 was made. The final treatment plan was ceramic inlay irt 36. All the procedures were explained to the patient and written informed consent was taken.

The old restoration was removed. An inlay cavity preparation was made [Figure 3b], in which the pulpal floor should be flat over most of its extent. The occlusal divergence per wall is kept at 6°–8°. The depth of the occlusal step is in the range of 1.5–2.0 mm. The width of the isthmus should be a minimum of 1.5 mm and the axial reduction in the proximal box also on average be 1.5 mm. After cavity preparation, the impression was made using polyvinyl silicone material [Figure 3c], and a cast was made

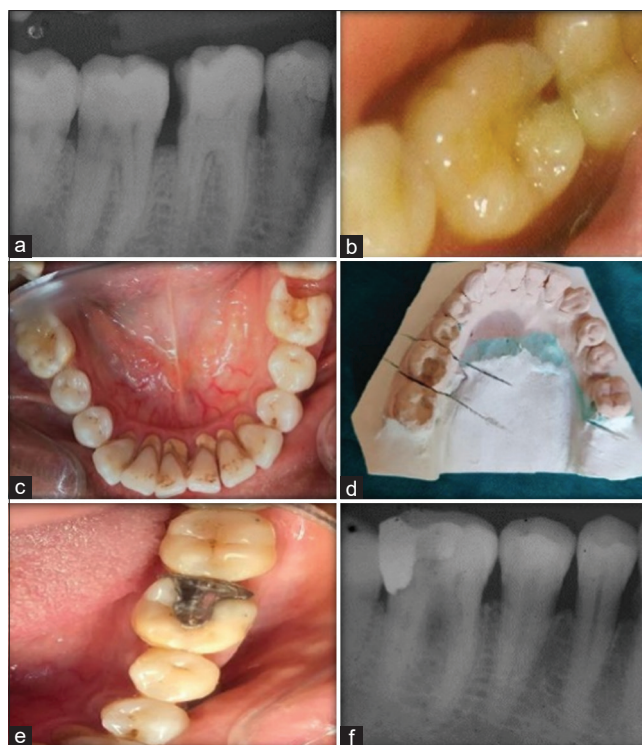


Figure 2: (a) Pre-operative radiograph (b) pre-operative picture (c) cavity preparation (d) cast (e) post-operative picture (f) post-operative radiograph

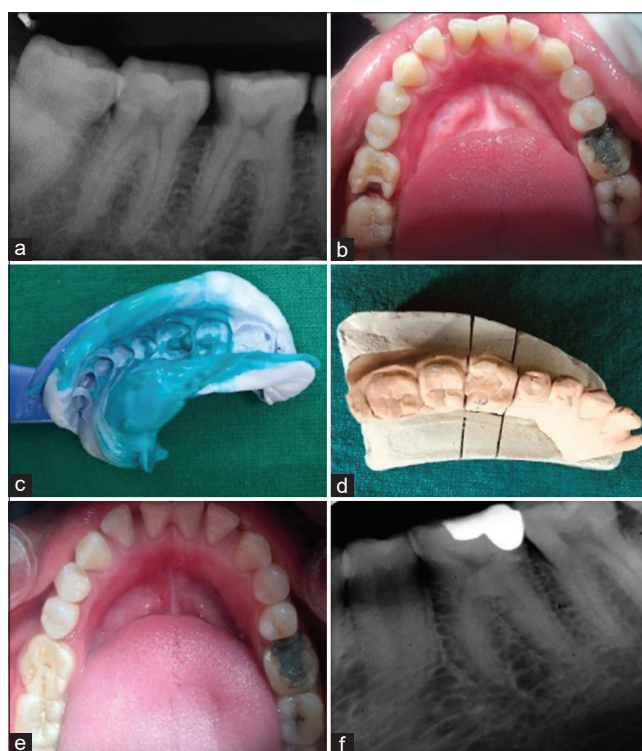


Figure 3: (a) Pre-operative radiograph (b) cavity preparation (c) polyvinyl impression (d) cast (e) post-operative picture (f) post-operative radiograph

[Figure 3d] and send to the laboratory for fabrication. The inlay was tried in [Figure 3e] and cementation was done

as above cases. A post-operative radiograph was taken [Figure 3f].

DISCUSSION

The primary emphasis for dentistry now is the preservation of tooth structure and reinforcement of tooth by reducing the fracture incidence of the restored tooth.^[8]

Newer modifications of composite resin and adhesive systems are increasing the demand for esthetic restorations in both anterior and posterior teeth. Depending on the respective clinical indication, resin composite materials are suitable for both direct and indirect restorations.^[9]

According to various clinical studies, composite resin restorations have the advantage to be more user-friendly and less expensive than ceramic inlay.^[5] The indirect composite resins are superior in esthetics, hue, and reduced post-operative sensitivity than the direct composite.^[10] Moreover, indirect restorations are more successful to achieve great morphology of the tooth and ideal proximal contacts. Another advantage is better integrity of the tooth/restoration interface which can result in increased longevity and reduced marginal leakage. The indirect composite resin provides greater stress distribution and reparability and it has lower cost and ease of manageability compared to ceramic materials.^[2]

In past years, silver amalgam was the oldest restorative material. It has good compressive strength but the drawback of this material was fracture of the restoration when used in large cavities. The composite is a tooth-colored restorative material but it has several disadvantages such as less strength, polymerization shrinkage, and hypersensitivity. Stainless steel or porcelain fused to metal or all ceramic are indicated for extensive caries but the limitations are not being conservative, thus the best treatment for proximal caries is Class II inlay cast restoration. The inlay is advisable for conservative restoration as it has the advantage of well-compressive strength which can withstand to heavy masticatory forces.^[11]

Recreating the original anatomy of the tooth resembling its natural appearance is a big challenge for the dentist. A good

personalized smile comprises shade, shape, and surface texture of the material which preserves sound tooth structure using a minimally invasive bonded restoration leading to less trauma and a superior prognosis. Hence, ceramic inlays are in great demand and acceptance in the field of esthetic dentistry. The excessively wide cavities may preclude the use of direct posterior composite restorations and here, the indirect restorations came into action for restoration of the tooth, as they found it superior over direct restorations in numerous ways, such as high biocompatibility, they do not encourage the concentration of dental plaque in their surfaces with perfect color stability, and ceramic stronger than composite resins and offers superior physical properties.^[9]

CONCLUSION

Indirect restorations provide excellent esthetics, better contact and contour, and longevity of the restoration in posterior dental arches.

REFERENCES

1. Silva RH, Ribeiro AP, Catirze AB, Pinelli LA, Fais LM. Clinical performance of indirect esthetic inlays and onlays for posterior teeth after 40 months. *Braz J Oral Sci* 2009;8:154-8.
2. Jose LM, Jose B, Jose J, Babu K. Indirect composite inlay restoration: A case report. *IP Indian J Conserv Endod* 2022;7:49-54.
3. Ricketts D, Bartlett D. *Advanced Operative Dentistry*. 1st ed: Elsevier; 2011. ISBN 9780702045660
4. Ricketts James DN, Bartlett DW. *Advanced Operative Dentistry: A Practical Approach*. Edinburgh: Churchill Livingstone; 2011.
5. Hopp CD, Land MF. Considerations for ceramic inlays in posterior teeth: A review. *Clin Cosmet Investig Dent* 2013;5:21-32.
6. Summitt JB. *Fundamentals of Operative Dentistry: A Contemporary Approach*. Berlin: Quintessenz Verlag; 2011.
7. Summitt JB. *Fundamentals of operative Dentistry: A Contemporary Approach*. 3rd ed. Chicago: Quintessence Pub; 2006.
8. Mital P, Thanvi C, Raisingani D, Prasad AB, Bhamboo A, Srivastava H. Tooth-colored restoration in molars: Three case reports. *J Mahatma Gandhi Univ Med Sci Tech* 2017;2:176-80.
9. D'Arcangelo C, Vanini L, Casinelli M, Frascaria M, De Angelis F, Vadini M, *et al.* Adhesive cementation of indirect composite inlays and onlays: A literature review. *Compend Contin Educ Dent* 2015;36:570-7.
10. Basudan TA, Alshareef SM, Alshehri AJ, Alkhalil HA, Alhowifi SD, Alhusain AM, *et al.* Differences of direct and indirect resin composite and its effect on esthetic restoration. *Int J Community Med Public Health* 2021;8:4622.
11. Deshpande PM, Metta K, Prashanth BR, Naik RR. Adjacent interproximal caries – The best treatment of choice is mod inlay: A case report. *IJADS* 2016;2:81-4.

How to cite this article: Dubey J, Rungta V, Saini R, Dutta A, Agrawal P. Replacement of Defective Restorations in Posterior Teeth: An Inlay Case Series. *Int J Sci Stud* 2023;11(3):4-7.

Source of Support: Nil, **Conflicts of Interest:** None declared.