

Aesthetic and functional restoration of a maxillary premolar using a veneerlay – a case report

Estetyczna i funkcjonalna odbudowa zęba przedtrzonowego szczęki z zastosowaniem licówki – opis przypadku

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Summary

Indirect bonded partial restorations, such as veneerlays, have emerged as a rational and conservative alternative to full-coverage crowns. Veneerlays combine the advantages of overlays and veneers, enabling functional reinforcement of weakened cusps and aesthetic enhancement of the facial surface while preserving maximum sound tooth tissue. However, it remains poorly documented in the current literature, which underscores the relevance and importance of the present case report.

A 24-year-old female patient presented to the fixed prosthodontics department. She complained of periodic irritation and pain due to recurrent food impaction between teeth #24 and #25. She was also dissatisfied with the greyish aspect of tooth #24, heightened with the presence of a zirconia crown on tooth #25. Given the aesthetic concern, the amount of residual tooth structure, and the thickness of the remaining walls, a lithium disilicate-reinforced glass ceramic veneerlay on tooth #24 was indicated.

The veneerlay is an innovative option in minimally invasive dentistry, offering a

Streszczenie

Pośrednie, częściowe odbudowy adhezyjne, takie jak nakładki licówkowe, stały się racjonalną i zachowawczą alternatywą dla koron pełnopokryciowych. Nakładki licówkowe łączą zalety nakładek i licówek, umożliwiając funkcjonalne wzmocnienie osłabionych guzków i estetyczną poprawę powierzchni licówki, przy jednoczesnym zachowaniu maksymalnej ilości zdrowych tkanek zęba. Jednakże, nadal są słabo udokumentowane w bieżącej literaturze, co uzasadnia istotność i wagę niniejszego opisu przypadku.

Pacjentka w wieku 24 lat skarżyła się na okresowe podrażnienia i ból spowodowane nawracającym zaleganiem resztek jedzenia między zębami 24 i 25. Była również niezadowolona z szarawego wyglądu zęba 24, szczególnie w sąsiedztwie korony cyrkonowej na zębie 25. Ze względu na aspekt estetyczny, ilość resztkowej tkanki zęba oraz grubość pozostałych ścianek, wskazane było zastosowanie nakładki licówkowej z ceramiki szklanej wzmocnionej dwukrzemianem litu na zębie 24.

Nakładka licówkowa to innowacyjna opcja w stomatologii minimalnie inwazyjnej, oferująca zachowawcze rozwiązanie w przypadku zębów

conservative solution for posterior teeth with substantial structural loss while preserving enamel for optimal bonding. The success of veneerlays depends not only on precise preparation design but also on a proper case selection and a rigorous and standardized clinical protocol.

bocznych ze znaczną utratą struktury, przy jednoczesnym zachowaniu szkliwa dla optymalnego wiązania. Sukces tego typu licówek zależy nie tylko od precyzyjnego projektu preparacji, ale także od właściwego doboru przypadku oraz rygorystycznego i znormalizowanego protokołu klinicznego.

Introduction

Minimally invasive dentistry has gained increasing importance in recent years, emphasizing the preservation of healthy dental structures while achieving functional and aesthetic success. Clinically, it implies removing and replacing tissue with as little loss as possible.¹ At the heart of this approach lies the concept of the *therapeutic gradient*, a fundamental principle in conservative dentistry. It promotes the selection of the least invasive treatment option that can adequately meet clinical demands.^{2,3}

Within this framework, indirect bonded partial restorations, such as veneerlays, have emerged as a rational and conservative alternative to full-coverage crowns.

Veneerlays combine the advantages of overlays and veneers, enabling functional reinforcement of weakened cusps and aesthetic enhancement of the facial surface, while preserving maximum sound tooth tissue.⁴ Their application is particularly relevant in cases requiring both occlusal reconstruction and aesthetic correction, without resorting to extensive tooth preparation.⁵

This article aims to outline the indications, preparation design and clinical benefits of veneerlays, highlighting their role in modern adhesive restorative strategies through a clinical case report.

Case report

A 24-year-old female patient presented to the fixed prosthodontics department. The medical history was noncontributory. She complained of periodic irritation and pain due to recurrent food impaction between teeth #24 and #25. She was also dissatisfied with the greyish aspect of tooth #24, heightened by the presence of a zirconia crown on tooth #25.

Extra-oral clinical examination revealed a gummy smile and a greyish discoloration of tooth #24 (Fig. 1). The patient also manifested anterior crowding. Although she was advised to consult an orthodontist on this issue, she stated that this feature gave her smile a personalized character and therefore did not wish to undergo orthodontic treatment.

Intra-oral examination showed a zirconia crown on tooth #25, while tooth #24 presented a Class II cavity filled with amalgam. The contact area between the two teeth was open, with bleeding upon probing (Fig. 2).

A periapical radiograph confirmed adequate endodontic treatment on both teeth #24 and #25, but also demonstrated the absence of a proper interproximal contact (Fig. 3).

Following removal of the amalgam, the residual tooth structure was evaluated using a thickness gauge. The buccal cusp measured less than 1 mm in thickness and therefore required cuspal coverage. By contrast, the palatal cusp



Fig. 1. Initial smile of the patient.



Fig. 2. Initial case.

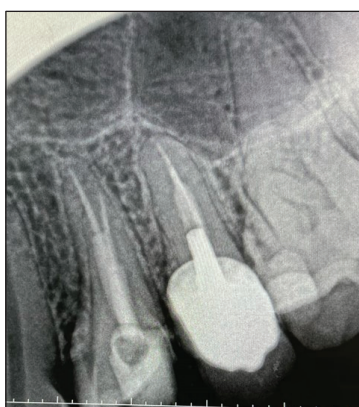


Fig. 3. Preoperative radiograph.



Fig. 4. Removal of amalgam restoration and occlusal contact areas verified.



Fig. 5. Residual tooth structure evaluated using a thickness gauge.



Fig. 6. Final preparation.

was preserved with more than 2 mm of thickness. Using articulating paper, static and dynamic occlusal contacts were identified carefully. This step enabled the precise localization of the tooth–restoration interface. It was determined that the location of the occlusal contact points ruled out the use of an onlay.

The margin of the proximal cavity was supragingival, which is essential to facilitate

effective isolation and moisture control. Most importantly, a preserved cervical enamel margin was observed.

The patient's oral hygiene was rated as medium, with minor gingival irritation and plaque accumulation especially in the afflicted quadrant.



Fig. 7. Vestibular and occlusal reduction.



Fig. 8. Provisional preparation and occlusion control.



Fig. 9. The veneerlay.

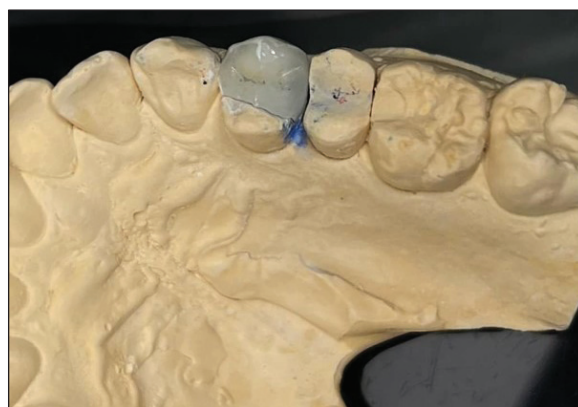


Fig. 10. Final restoration: occlusal view.



Fig. 11. Final restoration: buccal view



Fig. 12. The final result.

Given the aesthetic concern, the amount of residual tooth structure and the thickness of the remaining walls (Fig. 4, 5), a veneerlay on the tooth #24 was indicated. In view of the necessity of optimizing distal contact area, in the presence of a ceramic crown on the adjacent tooth,

lithium disilicate-reinforced glass ceramic (IPS emax®CAD) material was selected.

The access cavity was restored using a highly filled flowable composite (ENA HRi®Bisico, Germany) prior to the final preparation.

The preparation involved a 0.6 mm reduction

of the buccal surface and a 1.5 mm occlusal reduction, involving the buccal cusp. It extended beyond the intercuspatal groove; on the palatal cusp, occlusal contact area was carefully preserved and not included in the preparation design. To guarantee adequate clearance, while preserving the natural proximal contour, the proximal preparation on the mesial aspect included a palatal extension beneath the preserved contact zone. On the distal side, since no contact point was present, the preparation extended directly onto the occlusal surface. Particular care was taken to round the occluso-vestibular angle precisely, as sharp internal line angles are known to create stress concentrations that may lead to ceramic fractures, particularly in brittle materials such as lithium disilicate (Fig. 6, 7).

An optical impression was performed using Carestream 3600® and VITA Tooth guide 3D-MASTER was used for shade selection. Then, a provisional acrylic resin restoration was fabricated and cemented using eugenol-free temporary cement (Fig. 8).

Lithium disilicate material (IPS e.max CAD, Ivoclar Vivadent) was chosen based on its strength and aesthetic properties, and veneerlay was designed using an indirect CAD/CAM workflow (Fig. 9, 10, 11, 12).

At a later clinical session, an intraoral try-in was carried out. The provisional restoration was first removed and the preparation cleaned with chlorhexidine gluconate. The veneerlay was first evaluated on the working cast and then tried intraorally using a try-in gel to assess fit, adaptation and aesthetics.

Once approved, the internal surface of the porcelain restoration was etched with 4% hydrofluoric acid solution (Porcelain Etchant, eCEMENT Kit, BISCO) for 90s, then washed thoroughly under running water and air-dried. It was then cleaned with 37% phosphoric acid (Select HV Etch w/BAC®, eCEMENT Kit, BISCO) for 60 s, washed under running water and air-dried.

A silane-coupling agent (Porcelain Primer, eCEMENT Kit, BISCO) was then applied.

As for the dental substrate preparation, and after rubber dam isolation, 37% phosphoric acid (Select HV Etch w/BAC®, eCEMENT Kit, BISCO) was applied for 15s, followed by washing and air drying; two consecutive coats of the adhesive system (All-Bond Universal®, eCEMENT Kit, BISCO) were then applied and rubbed actively on the tooth surface, then gently air-dried for 5s to evaporate solvents and light cured for 10s.

The veneerlay was luted using a translucent light-cured luting agent (eCEMENT Light-Cure®, eCEMENT Kit, BISCO).

The restoration margins were first light cured for 5s on each side, the cement excess was removed carefully. Finally, all faces of the restoration were light cured for 60s.

The bonding session was concluded with a careful static and dynamic occlusal adjustment in areas marked with articulating paper (Hanel® Articulating Paper, Coltène/Whaledent). The adjusted surfaces were then polished using polishing rubber (Jiffy® Polishers; Ultradent).

The result was functionally and aesthetically satisfactory, and the patient expressed a high level of satisfaction with the outcome (Figure 12)

A follow-up appointment was conducted one week later to evaluate tissue response, marginal integrity and occlusion.

Discussion

Veneerlays are indicated in a variety of clinical situations where both functional and aesthetic demands must be addressed while preserving as much sound tooth structure as possible. Their use is particularly appropriate in situations of extensive loss of occlusal surface due to wear, fracture or previous restorations, requiring cusp coverage without full circumferential preparation. Other indications include aesthetic correction of premolars with facial discolorations,

shape anomalies or size discrepancies, combined with occlusal rehabilitation.^{5,6}

In our case, the maxillary first premolar exhibited a failing amalgam restoration associated with a weakened buccal cusp, an endodontic access cavity and a compromised distal marginal ridge. Amalgam restorations are based on a mechanical retention concept, which requires extensive preparation involving undercuts and the removal of sound tissue structure. However, in order to avoid radicular anchorage or full crowns, which compromises the long-term biomechanical integrity of the tooth, partial indirect restorations represent a valuable alternative especially when remaining tooth structure supports adhesive techniques.⁷

In such cases, a minimally invasive approach can be adopted, avoiding unnecessary removal of healthy tissue and reducing the risk of further weakening of the tooth. Rather than opting for a traditional full crown, which may not be justified, adhesive partial restorations such as veneerlays can provide both structural reinforcement and aesthetic integration while preserving the remaining dental tissues.⁸

By combining the functional coverage of an overlay with the aesthetic benefit of a veneer, veneerlays provide a versatile and minimally invasive treatment option for complex restorative cases.

The selection of material for veneerlays depends on the balance between aesthetics, strength, and adhesion. Lithium disilicate glass-ceramics (IPS e.max®) are widely preferred due to their high translucency, excellent aesthetics and adequate flexural strength, making them suitable for anterior and premolar teeth with conservative preparations. Hybrid ceramics provide ease of milling and intra-oral reparability, though with slightly reduced aesthetic performance. For situations with high occlusal load or minimal remaining tooth structure, high-translucency zirconia may be chosen due to its exceptional strength, albeit

with lower translucency and the need for proper surface treatment to ensure adhesion. Overall, material choice should consider enamel availability, occlusal forces and the desired aesthetic outcome.^{9,10}

The preparation of a veneerlay restoration requires a meticulous approach that balances structural preservation with optimal adhesion and restoration longevity. As a hybrid between an overlay and a veneer, the preparation involves both the occlusal and buccal surfaces, without involving circumferential reduction unless clinically indicated. A supragingival or equigingival finish line is preferred, following a butt joint or light chamfer configuration. A subgingival extension should be avoided unless dictated by pre-existing restorations or structural defects. In fact, subgingival preparation presents several challenges: access and visibility are often limited, making precise preparation more difficult. The possibility of maintaining a dry prosthetic field during cementation is more challenging. Additionally, subgingival preparations carry a higher risk of cement overhangs and can potentially cause periodontal irritation or inflammation.

Proximal surfaces are included only if affected by previous restorations, caries or fractures. The goal is to maintain contact points and avoid unnecessary invasion into healthy proximal areas. Unlike full crowns, veneerlays preserve axial walls. This conservative approach helps maintain structural integrity.¹¹ Smooth and continuous margins are essential for proper impression-taking, adaptation of the restoration and marginal seal. Feather-edge or knife-edge preparations should be avoided.

This preparation philosophy aligns with the principles of adhesive dentistry, maximizing the bonding surface area while minimizing the removal of healthy dental tissue.

This adhesive approach, when executed properly, allows veneerlays to provide excellent

mechanical retention, aesthetic integration and long-term durability, while preserving maximal natural tooth structure.¹²

Conclusion. The veneerlay is an innovative option in minimally invasive dentistry. Its success depends not only on precise preparation design but also on a proper case selection and a rigorous and standardized clinical protocol.

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