Content available at: https://www.ipinnovative.com/open-access-journals

Journal of Dental Specialities

Journal homepage: https://www.jdsits.in/

Case Report

Management of occlusal biocorrosion defect induced hypersensitivity on posterior teeth with indirect lithium disilicate and semidirect composite veneers with the re-enamelizing approach –two case reports

Dishant R Dave[1], Purnil B Shah[1], Arjun J Barot[1], Sonali V Kapoor[1]*, Hemal Dhairya Patel[1], Anshumi P Gajjar[1]

[1]Dept. of Conservative Dentistry and Endodontics, Manubhai Patel Dental College and Hospital, Mujmahudha, Vadodara, Gujarat, India

Abstract

Dental hypersensitivity is a common concern for many patients, often caused by the exposure of dentinal tubules. Various treatments have been suggested in the past, such as flowable composite restorations, medicated toothpastes, and mouthwashes, with the aim of reducing sensitivity. However, these methods often fall short in fully addressing the issue, as they do not adequately seal or protect the open dentinal tubules, leaving patients still vulnerable to discomfort. This brings us to a more effective approach i.e indirect and semi-direct bonded restorations, such as occlusal veneers. These restorations offer several benefits over traditional treatments, providing a more durable, aesthetic, and minimally invasive solution to hypersensitivity.

The Ultrathin bonded lithium disilicate posterior occlusal veneers or Semi direct composite occlusal veneers represent a conservative alternative to the traditional composites and complete coverage crowns for the treatment of occlusal wear. So these case reports emphasis on stable performance of occlusal veneers with 18 months follow-up in the patients with occlusal wear without loss of vertical dimension.

Key Message: Ultra-thin occlusal veneers are game changers in full mouth rehabilitation as well as in occlusal correction procedures especially when symptomatic relief from sensitivity and tooth preservation are considered altogether.

Keywords: Biocorrosion, Hypersensitivity, Occlusal veneer, Lithium disilicate, Semidirect

Received: 22-08-2024; **Accepted:** 04-02-2025; **Available Online**: 23-04-2025

1. Introduction

Biocorrosion is caused by the chemical, biochemical, and electrochemical degradation of tooth substance like enamel and dentin, leading to the loss of tooth structure due to both endogenous and exogenous acids, as well as proteolytic agents acting on the dentin. At the same time, dental caries play an additional role to worsen the consequences of biocorroision defects. Since it combines both acidogenesis (chemical action) and proteolysis (biochemical action), it exaggerates the harmful effects of biocorrosion like hypersensitivity, discomfort and pain.[1]

In such cases, indirect restorations are considered as a primary treatment modality than considering the hypersensitivity therapy. Therefore, the ultrathin occlusal veneers have presented a promising modality to address the principles of optimal form, occlusion, and function while abiding by the biomimetic rule of maximum tissue conservation.[2] The indirect ultrathin bonded lithium disilicate posterior occlusal veneers because of their enamel-like properties represent a conservative alternative to the composites and complete coverage crown for the treatment of occlusal wear.[3] In addition to above method the semidirect technique for fabrication of composite occlusal veneers is an alternative conservative modality for advantages of fewer appointments, minimal tooth reduction, easily repairable, allows for immediate feedback from the patient and less laboratory time, which reduces the overall treatment time and cost for patients.[4]

So, the present case report focuses on the performance of occlusal veneers with indirect and semidirect techniques for

*Corresponding author: Sonali V Kapoor
Email: dishantdave10@gmail.com

http://doi.org/10.18231/j.jds.2025.022

managing occlusal bio-corrosive defects in patients to restore the lost tooth structure with a follow-up of 18 months.

2. Case History

*2.1. Case 1 – Indirect lithium disilicate occlusal veneer (**Figure 1**)*

A 45-year-old female patient reported to the department with the chief complaint of sensitivity in the upper right back tooth region since 2-3 months on consumption of hot and cold beverages.

On clinical and radiographic examination there were distinct sensitive points on the exposed dentinal surface due to attrition on the occlusal surface in relation to Upper right first molar. The tooth was vital on pulp sensitivity testings. On radiographical examination signs of proximal attrition and proximal caries were evident along with sufficient remaining dentinal thickness (approx. 2.5 mm) so the treatment planning advised was occlusal veneer instead of full coverage restorations and informed consent was taken from both the patient. The occlusal veneers were planned with the biomimetic principle to re-enamalize the lost tooth structure to overcome dentinal hypersensitivity after examining sufficient tooth substance clinically and radiographically according to the methodology advised by Magne et al.[3,9]

2.2. Clinical procedure

2.2.1. Tooth preparation for occlusal veneer

The depth of approximately 0.4 to 0.6 mm at the central groove to 1.0 to 1.5 mm at the cusp tip level was accomplished with specialized 1.5 mm occlusal depth cutting bur (DC 1.5). With the help of a diamond occlusal reduction bur, uniform reduction throughout the occlusal surface was carried out.

Caries excavation was carried out in the proximal box with a round diamond point.[3] The box preparation was carried out only in the mesial proximal caries area, while preserving the distal contact.

2.2.2. Immediate dentinal sealing (IDS) and impression

The bonding procedures were carried out by Selective etching with 37% phosphoric acid (Ultra-Etch Ultradent Products, Inc) and immediate dentinal sealing was carried out with Clearfil™ Se Bond 2 (Kuraray) and flowable composite Clearfil Majesty Flow (Kuraray) with a high filler content 81% and thickness of approx 0.2-0.3 mm. Immediate dentinal sealing is a sealing adhesive technique that reduces post-cementation hypersensitivity and improves adhesion for indirect restoration, especially in those indirect restorations in which hypersensitivity is more common after cementation and retention are difficult to achieve such as porcelain laminated veneer.[13] High filler content offers characteristics like curing with less polymerization shrinkage.[14] After application of bonding agent with a micro brush for 2-3 mins, the surface was left without curing for 5 min to get the advantage of decoupling with the time for enough maturation of dentinal bond and to preserve the hybrid layer of dentin.[4]

Dual step silicon putty impression was taken and sent to the laboratory for fabrication of indirect lithium disilicate E-max occlusal veneer.

2.3. Cementation

After trial, to check the marginal fit of the occlusal veneer, final cementation was intiated.

The intaglio surface of restoration was etched with 10% hydrofluoric acid for 20 seconds. After rinsing with tap water for 1 minute and cleaning with an air-water spray for 30 seconds, the surface was air-dried. The intaglio surfaces were then silanized by brushing with Monobond Plus (Universal Primer, Ivoclar) for 2-3 minutes.

Under complete isolation with a rubber dam, the resin cement (Calibra universal, Dentsply Sirona, Germany) was applied to both surfaces of the restoration and as well as of the prepared tooth surfaces.

After verifying the fit of the veneer, tack curing was performed for 5 seconds to soften the resin cement, making it easier to prevent excess cement from the margins of the indirect restorations using a curved explorer. The final polymerization with light curing was performed with LED curing light (Woodpecker ILED Plus) 1000mw/cm2 for 20 seconds on all surfaces for three cycles.

Tack curing of resin cement was performed by keeping the occlusal veneer marginal fit intact with gentle pressure with the help of Optrastick (Ivoclar Vivadent) for 5 seconds. After excess cement removal from all margins, final curing was performed with LED curing light (Woodpecker ILED Plus) 1000mw/cm2 for 20 seconds on buccal and palatal surfaces separately.

After which glycerine application and further light curing was performed to remove oxygen inhibition layer. After removal of excess cement with Bark parker blade at the marginal area the margins were finished and polished with composite and Emax polishing kit.

*2.4. Case -2 Semi direct composite occlusal veneer (**Figure 2**)*

A 26 year old female reported with the chief complaint of sensitivity in lower left back tooth region, Upon clinical examination, enamel loss was observed, and the early response to the cold test was reported that confirmed the diagnosis of reversible pulpitis. Thus the treatment plan of semidirect composite occlusal veneer based on biomimetic principle was planned to re- enamalize the lost tooth structure and to overcome dentinal hypersensitivity using the chair side

semidirect technique for fabrication of composite occlusal veneer with the use of flexible die silicone (Voco).

2.5. Clinical procedure

2.5.1. Tooth surface preparation and impression

Under local anaesthesia (lignocaine with adrenaline 1:80,000; Lignox 2% A, Indoco Remedies Ltd, Mumbai, India) the tooth preparation was initiated. To provide uniform tooth reduction; occlusal depth cuts of approximately 0.4 to 0.6 mm at the central groove and 1.0 to 1.5 mm at the cusp tip level were performed with specialized 1.5mm occlusal depth cutting bur (DC 1.5). With the help of a coarse diamond occlusal reduction bur, uniform reduction throughout the occlusal surface was carried out.

After thoroughly drying the occlusal tooth surface the immediate dentinal sealing was performed using Clearfil SE Bond 2 (Kuraray), followed by 30 seconds of light curing. A layer of flowable composite Clearfil Majesty Flow (Kuraray) (0.3 to 0.5mm) was applied, light-cured for 30 seconds with an LED curing light (Woodpecker ILED Plus) at 1000mW/cm². Final finishing of enamel surface was performed with yellow grit bur, and petroleum jelly was applied and light-cured for 20 seconds to prevent the oxygen inhibition layer on IDS. Finally, impression was taken using irreversible hydrocolloid (Alginate) material.

2.5.2. Die and composite occlusal veneer fabrication ***(Figure 3)***

Die silicone (DIE SILICONE-VOCO, Germany) was injected into an irreversible hydrocolloid impression with constant tapping to prevent air inclusion, After 2 minutes setting time flexible die was removed from impression. After excess removal the final die was used as a base for the fabrication of occlusal veneer. Using nanohybrid composite (3M Filtek Z350XT, USA); occlusal veneer was fabricated in a layering manner on the die enabling the cementation of occlusal veneer on the same day followed by finishing and polishing of restoration.[11]

2.5.3. Cementation of occlusal composite veneer

1. Under isolation, selective etching was performed using 37% phosphoric acid (Ultra-Etch Ultradent Products, Inc) on to the prepared tooth surface for 30 seconds.
2. The etched surface was rinsed and dried for 30-50 seconds.
3. Bonding agent was applied followed by light curing for 30-40 seconds.
4. The self-adhesive resin cement (Calibra Universal, Dentsply Sirona, Germany) was applied to the intaglio surface of the restoration & on the tooth surface followed by veneer placement and light curing. Excess cement removal was performed with B.P. blade followed by finishing and polishing and application of petroleum jelly to prevent oxygen inhibition layer.

Follow up visits were planned after 1 week, 1 month, 1 year and 18 months. In each visit the presence or absence of symptoms, pulpal responses to the cold test, responses to palpation and percussion tests, and evaluation of the surface area, surface structure, and roughness were evaluated. The success of the occlusal veneer was defined as the absence of clinical signs or symptoms and without any progressive radiographic pathosis during regular follow-up. Dental veneers generally have a high survival rate (>90% for more than 10 years).[6]

Figure 1: A: Pre-operative photographs; **B:** Pre-operative radiograph; **C:** Occlusal depth cuts **D:** Caries excavation followed by tooth preparation; **E:** Selective etching & Immediate Dentinal Sealing; **F:** 1.3mm thin CAD fabricated EMAX lithium disilicate occlusal veneer; **G,H:** Post-operative results with 18 months of Follow-up.

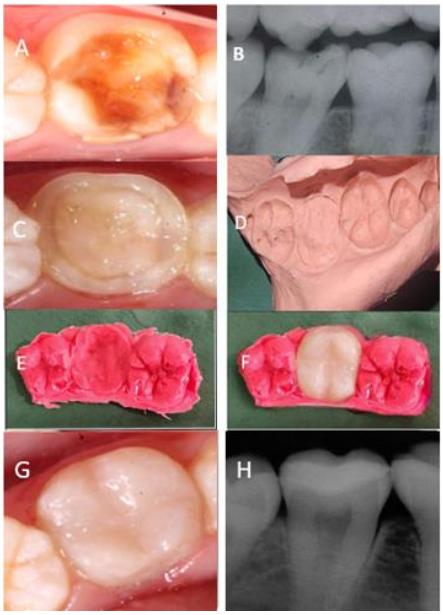

Figure 2: A,B: Pre-operative records for occlusal veneer; **C:** Occlusal reduction and immediate dentinal sealing; **D:** Irreversible hydrocolloid Alginite impression; **E:** Flexible Die silicone (DIE SILICONE-VOCO) made from Alginite impression; **F:** Composite occlusal veneer is fabricated using Nanofilled composite (3M Z350XT); **G,H:** Post-operative records with 18 months of follow-up.

Figure 3: Flexible die silicone (DIE SILICONE-VOCO)

Some marginal discoloration was noted in composite occlusal veneer it was managed by composite finishing and polishing kits and rubber cups after 1 year. After 18 months, the same finishing and polishing steps were followed for the Emax occlusal veneer, although no structural deformity was noticed.

3. Discussion

Novel biomimetic dentistry explores different avenues to preserve lost tooth structures both in form and function. The goal of the same is not only to replace key components of enamel and dentin but also to put emphasis on the restoration of the dentino-enamel junction as a flexible junction. This restoration of DEJ with a bonding agent and immediate dentinal sealing has proven to be a game changer in bonded restorations.[2]

The immediate dentinal sealing has enabled the biomimetic dentist to utilize thinner to thinnest indirect restorations (0.8mm) still achieving appropriate strength to bear with constant occlusal forces exerted on the tooth. This approach is so efficient that it can be very well utilized globally for the management of para-functional habits as an additive approach for full-mouth rehabilitation cases.[5]

In cases of isolated occlusal wear on posterior teeth, another major trouble is the sensitivity of the patient. Restoration with direct composite remains a temporary approach as under para-functional habits the longevity of composite remains questionable.[6] At the same time, full coverage crowns will compromise maximum tooth structure. So conservative occlusal veneers can play a significant role in such cases. Just like anterior veneers created with the novel biomimetic approach, posterior occlusal veneers can also be made from CAD-CAM lithium disilicate, with a thickness ranging from 0.8 to 1.2 mm.[7] This approach was described by Pascal Magne et al and now it is used as a conservative modality to treat biocorrosion-related hypersensitivity on the isolated posterior tooth.[9] This restoration is also known as re-enamelized occlusal veneers as it restores the lost enamel substances and acts as a compression dome for equal load distribution throughout the restoration that way increasing the longevity of the same.[8,9]

The most common material used for occlusal veneer is Lithium disilicate or Emax. Emax has flexural strength equivalent to tooth enamel.[10] Along with Immediate dentinal sealing and resin cement, the flexible junction of DEJ can also be very well restored for indirect Emax occlusal veneers. The only disadvantage is it is technique-sensitive and expensive.[10]

A semi-direct technique using a flexible die and composite resin allows the chair side fabrication without tedious laboratory work. Here, the composite occlusal veneer was fabricated with Nano hybrid composite to gain the benefit of lesser polymerization shrinkage, better viscosity, better adaptability, and appropriate flexural strength. It also improves the degree of conversion microhardness and wear resistance because of higher filler content. The bonding strategy incorporates self-etch adhesives (Clearfil SE Bond 2, Kuraray) for both Immediate dentinal sealing and final cementation of composite occlusal veneer. The filler content allows for a more consistent and uniform layer as compared to unfilled systems.[4] The resin cement utilized was Calibra Universal by Densply Sirona(Germany) it is a dual cure self-adhesive cement that also contains fluorides. The dual cure nature of cement assures appropriate polymerization below the occlusal veneer.[4]

Non-rigid occlusal splints were provided for both cases to compensate for the higher occlusal forces and structural loss noticed pre-operatively.

4. Conclusion

The present case series highlights the efficacy of indirect Emax occlusal veneers and semi-direct composite veneers as permanent conservative modalities, particularly for managing bio-corrosion-induced single-tooth enamel loss and associated long term dental hypersensitivity. While long-term clinical survival studies are necessary, the initial outcomes are promising and consistent with the previous research utilizing similar techniques.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Grippo JO, Simring MA, Coleman TA. Abfraction, abrasion, biocorrosion, and the enigma of noncarious cervical lesions: a 20-year perspective. *J Esthet Restor Dent*. 2012;24(1):10–23. doi: 10.1111/j.1708-8240.2011.00487.x..
2. Dionysopoulos D, Gerasimidou O. Biomimetic dentistry: Basic principles and protocols. *ARC J Dent Sci*. 2020;5(3):1–3.
3. Schlichting LH, Resende TH, Reis KR, Dos Santos AR, Correa IC, Magne P. Ultrathin CAD-CAM glass-ceramic and composite resin occlusal veneers for the treatment of severe dental erosion: An up to 3-year randomized clinical trial. J Prosthet Dent. 2022;128(2):158-e1–e12.
4. Maeder M, Pasic P, Ender A, Özcan M, Benic GI, Ioannidis A. Load-bearing capacities of ultra-thin occlusal veneers bonded to dentin. *J Mech Behav Biomed Mater*. 2019:95:165–171. doi: 10.1016/j.jmbbm.2019.04.006.
5. Spohr AM, Borges GA, Platt JA. Thickness of immediate dentin sealing materials and its effect on the fracture load of a reinforced all-ceramic crown. *Eur J Dent*. 2013;7(4):474–83.
6. Ladino LG, Sanjuan ME, Valdéz DJ, Eslava RA. Clinical and biomechanical performance of Occlusal Veneers: a scoping review. *J Contemp Dent Pract*. 2021;22(11):1327–37.
7. Sasse M, Krummel A, Klosa K, Kern M. Influence of restoration thickness and dental bonding surface on the fracture resistance of full-coverage occlusal veneers made from lithium disilicate ceramic. *Dent Mater*. 2015;31(8):907–15.
8. Belli R, Geinzer E, Muschweck A, Petschelt A, Lohbauer U. Mechanical fatigue degradation of ceramics versus resin composites for dental restorations. *Dent Mater*. 2014;30(4):424–32.
9. Resende TH, Reis KR, Schlichting LH, Magne P. Ultrathin CAD-CAM ceramic occlusal veneers and anterior bilaminar veneers for the treatment of moderate dental biocorrosion: A 1.5-year follow-up. *Oper Dent*. 2018;43(4):337–46.
10. Czechowski Ł, Dejak B, Konieczny B, Krasowski M. Evaluation of Fracture Resistance of Occlusal Veneers Made of Different Types of Materials Depending on Their Thickness. *Materials*. 2023;16(17):6006.
11. Do Nascimento Poubel DL, da Silva RC, Ribeiro AP, Garcia FC. Effect of preheating on the viscosity of composite resins. *J Conserv Dent Endod*. 2024r;27(4):360–65. .
12. https://www.voco.dental/portaldata/1/Resources/graphics/pdf/catalog/en-us_catalog.pdf
13. Omar S, Albelady W, Alharbi Y, Alzubaidi T, Shuailah L. Immediate Dentin Sealing for Indirect Bonded Restoration: Literature Review. *J Pharm Res Int*. 2023;35(1):4–17.
14. Mousavinasab SM. Effects of filler content on mechanical and optical properties of dental composite resin. Metal, Ceramic and Polymeric Composites for Various Uses. 1st ed. Rijeka, Croatia: In Tech. 2011;20:421–8.

Cite this article: Dave DR, Shah PB, Barot AJ, Kapoor SV, Patel HD, Gajjar AP. Management of occlusal biocorrosion defect induced hypersensitivity on posterior teeth with indirect lithium disilicate and semidirect composite veneers with the re-enamelizing approach –two case reports. *J Dent Spec* 2025;13(1):144-148.