Ultrathin CAD-CAM Ceramic Occlusal Veneers and Anterior Bilaminar Veneers for the Treatment of Moderate Dental Biocorrosion: A 1.5-Year Follow-Up

TH Resende • KR Reis • LH Schlichting • P Magne

Clinical Relevance

Ultrathin bonded posterior occlusal veneers represent a conservative alternative to traditional onlays and complete coverage crowns for the treatment of moderate and severe erosive lesions.

SUMMARY

Dental biocorrosion can produce a devastating impact on oral health. The restorative phase of the treatment should not cause additional damage of the remaining sound tooth structure. Ultrathin occlusal veneers are a conservative alternative to traditional onlays and complete crowns for the treatment of severe biocorrosive lesions. This strategy is explained in the present case report through a full-mouth rehabilitation of a patient with moderate biocorrosion. Maxillary anterior teeth were restored using the bilaminar technique (lingual direct composite veneers with labial ceramic veneers) and posterior teeth using ultrathin CAD-CAM ceramic occlusal veneers. The technical aspects required for the implementation of this new restorative design are presented with a special emphasis on the control of tooth preparation based on diagnostic wax-up, provisionalization, and the use of CAD-CAM technology.

Tayane H Resende, MS, Analytical Laboratory of Restorative Biomaterials - LABiom-R, School of Dentistry, Federal Fluminense University, Niterói, RJ, Brazil

Kátia R Reis, DDS, MS, PhD, Department of Prosthodontics and Dental Materials, School of Dentistry, Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil

*Luís H Schlichting, DDS, MS, PhD, Department of General Dentistry, School of Dental Medicine, East Carolina University, Greenville, NC 27834, USA

Pascal Magne, DMD, PhD, The Don & Sybil Harrington Professor of Esthetic Dentistry, Department of Restorative Sciences, Ostrow School of Dentistry, University of Southern California, Los Angeles, CA 90089, USA

*Corresponding author: East Carolina University, General Dentistry, 1851 MacGregor Downs Rd., Mail Stop #701, Greenville, NC 27834, USA; e-mail: luishschlichting@gmail.com

DOI: 10.2341/17-007-T

INTRODUCTION

The dental enamel shell is designed to withstand a lifetime,[1] as witnessed in many patients in their 80s and 90s who can still enjoy their teeth despite obvious signs of wear and cracking. However, the enamel thickness is reduced by dental biocorrosion. By definition, the term "erosion" is a physical mechanism, making the term "corrosion" more appropriate for dental tissues. Likewise, the term "biocorrosion" differs from "corrosion" because the prefix "bio-" designates chemical, biochemical, and electrochemical actions on enamel and dentin. Therefore, biocorrosion comprises endogenous and exogenous acidic and proteolytic chemical degradation of enamel and dentin as well the electrochemical piezoelectric action of the collagen in the dentin.[2] Modern lifestyles have led many to poor eating habits and dysfunctional behaviors that could explain the increase in prevalence of erosive lesions as well as their severity.[3] When experienced by young individuals, the tissue loss in moderate and severe cases of dental biocorrosion becomes problematic, resulting in significant biological (sensitivity and pulpal damage), esthetic, and functional consequences in addition to the complications due to the occlusal changes (with or without loss of the vertical dimension).[4]

Ultrathin occlusal veneers have been advocated as a conservative alternative to "re-enamelize" the occlusal surface compared to traditional overlays or full coverage crowns.[5,6] The intrinsic strength of materials like lithium disilicate–reinforced glass ceramics and high-performance composite resins,[7-12] combined with immediate dentin sealing,[13-15] allows for thinner designs. It has been observed that patients get motivated and encouraged when during a treatment planning presentation they learn that minimum or no additional reduction of tooth structure will be needed.

This article illustrates the application of these concepts in a full-mouth rehabilitation of a patient affected by moderate biocorrosion. In contrast with a previous article[16] where ultrathin CAD-CAM composite resin occlusal veneers were utilized (Lava Ultimate, 3M ESPE, St Paul, MN, USA), this case used a ceramic (e.max CAD, Ivoclar Vivadent AG, Schaan, Liechtenstein).

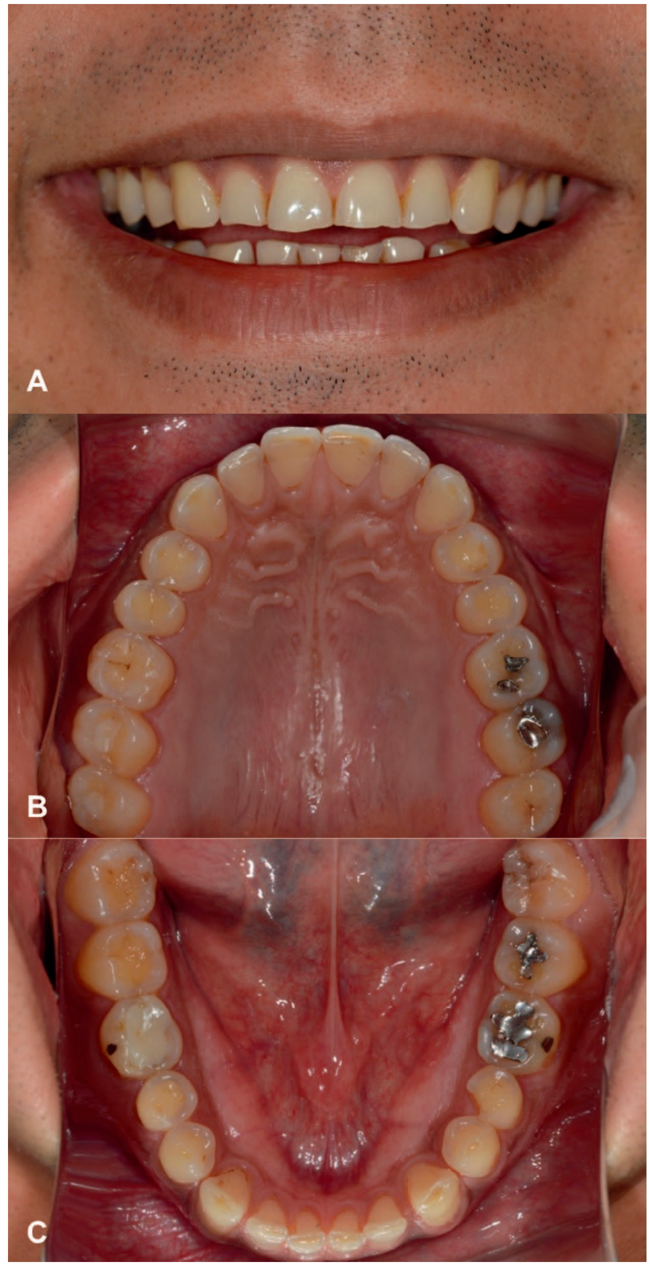

Figure 1. *Preoperative views of a 28-year-old male patient with moderate to severe dental biocorrosion and wear. (A): "Visual tension" can be perceived during smile due to biocorrosion/wear signs. (B-C): Intraoral occlusal views display severe loss of enamel with higher degree of destruction in the upper premolars and lower first and second lower molars.*

CLINICAL TECHNIQUE REPORT

A 34-year-old man presented to the Department of Prosthodontics and Dental Materials at the Federal University of Rio de Janeiro in 2015 requesting treatment for dentin sensitivity and dental wear. Intraoral evaluation revealed generalized dental wear, including dentin exposure and clinical evidence of dental biocorrosion.[3] Smooth and concave lesions become apparent on facial surfaces as well as cupped cusp tips, thinned or inexistent enamel covering the occlusal perimeter, and restorations standing above the level of the adjacent tooth structures (Figure 1A through 1C).

Regarding the etiology, the hypothesis of intrinsic origin associated with gastroesophageal reflux dis-

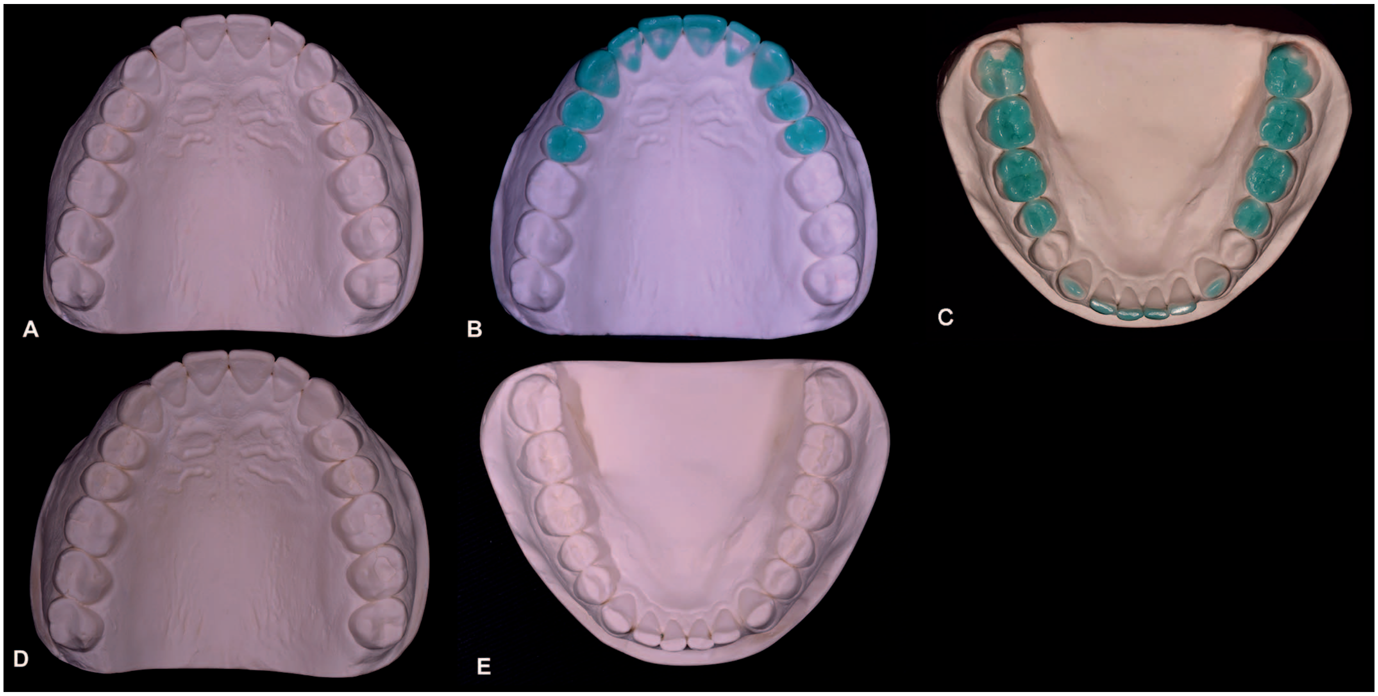

Figure 2. *(A): Scannable stone replica of waxed cast with unaltered canines as repositioning reference. (B-C): Complete waxing (including canines, mandibular incisal edges and mandibular third molars). (D-E): Scannable stone replica of the complete waxing were useful for anterior restorations (mock-up, selective preparations, provisionals and enabled the use of the biogeneric copy tool).*

ease could not be confirmed because of the dental wear pattern and patient medical history. However, the frequent consumption of acidic beverages (yerba mate tea with lemon) may explain the severity in this case. Furthermore, the presence of wear facets on the functional surfaces, such as the palatal and incisal edges of the maxillary and mandibular incisors, suggests the combination of biocorrosion and attrition disorder. The patient was immediately advised to control the intake of acid drinks and to use an occlusal guard to protect the teeth from mechanical wear.

The restorative treatment was set in two stages: ultrathin CAD-CAM ceramic occlusal veneers on selected posterior teeth and bilaminar veneers (direct composite resin on palatal and ceramic on labial) on maxillary anterior teeth.[17,18] Diagnostic casts (Pearl White GC Fujirock EP, GC America, Alsip, IL, USA) were obtained from complete arch polyvinyl siloxane impressions (Virtual, Ivoclar Vivadent). The bite was recorded at maximum intercuspal position (MIP), and casts were mounted on a semiadjustable articulator. Centric relation (CR) was initially considered; however, MIP position was utilized instead because the patient already had a retrognathic profile, which would be aggravated if CR was chosen. The vertical dimension of occlusion (VDO) was arbitrarily augmented by 1 mm at the incisal to allow space for the restoration on the palatal aspect of the maxillary anterior teeth and to minimize the amount of preparation required for the ultrathin occlusal veneers.[16] A complete mouth additive waxing was ordered (GEO Classic Mint-Opaque Wax, Renfert GmbH, Hilzingen, Germany) and carried out in two steps by the dental technician. First, all teeth planned to be restored (maxillary arch: anteriors and premolars; mandibular arch: second premolars, first and second molars) were additively waxed, except for the canines. Both waxed models were then duplicated (Elite Double 32 Fast, Zhermack, Badia Polesine, Italy) and poured with scannable stone (Snow Rock 3D Scan, Dk Mungyo Corp, Hanrim-myun Gimhae-si, Gyeongsangnam-do, South Korea) (Figure 2A). This step provided technical accuracy for intraoral repositioning of silicone guides for mock-up fabrication and provisional restorations and primarily enabled the use of the biogeneric copy in the software (CEREC inLab v4.0.2, Sirona Dental Systems GmbH, Bensheim, Germany) to generate the definitive restorations. Untouched canines and rearmost molars were strategic for the correlation between the waxed models and the preparations. Then the technician

Figure 3. *(A): Spot etching on unprepared enamel previous to mock-up fabrication. (B): Maxillary and mandibular mock-up (vertical dimension of occlusion increased by 1 mm). (C) Occlusal view of the posterior splinted provisional acrylic restorations.*

completed the waxing of the canines, lower incisal edges, and lower third molars (Figure 2B,C). The waxed models were duplicated and poured again (Figure 2D,E).

At the next appointment, mock-up restorations were fabricated intraorally for esthetic and VDO evaluation. Multispot etching on unprepared enamel was carried out to increase the retention of provisionals in poly(methyl methacrylate) resin (Dencôr Lay, Clássico, São Paulo, Brazil) (Figure 3A). The influence of the new VDO (+1 mm) in facial appearance as well as muscular comfort was evaluated for 15 days with splinted bonded provisional acrylic restorations (Figure 3B,C).[19] On the patient's approval, the provisional restorations were used as a reduction guide for the preparations with tapered diamond rotary instruments (product code 850.31.023 FG; Brasseler, USA). Depth cuts were marked with a pencil. The remaining acrylic was removed with an instrument, and preparation was completed by reducing between the guide grooves and erasing the pencil marks (Figure 4A,B). The average occlusal clearance was 0.4 to 0.6 mm (central groove) and 1.0 to 1.3 mm (cusp tips), generating minimal space for ultrathin occlusal veneers. After preparation, a rubber dam was placed, and areas of exposed dentin were refreshed with a coarse diamond bur at a maximum of 1500 rpm. Immediate dentin sealing (IDS) was achieved using a three-step etch-and-rinse dentin bonding agent (OptiBond FL, Kerr Corp, Orange, CA, USA) (Figure 4C)[13-15] according to the manufacturer's instructions. IDS was carried out without air thinning of the adhesive and with an additional light polymerization at 1000 mW/cm^2 (Valo, Ultradent Products Inc, South Jordan, UT, USA) for 10 seconds under an air barrier (K-Y Jelly, Johnson & Johnson, New Brunswick, NJ, USA) to reduce the oxygen inhibition layer. Excess adhesive resin and irregularities were then removed from the surrounding enamel by using a round diamond rotary cutting instrument (801.31.023 FG, Brasseler, USA) or tapered burs (850.31.023 FG, Brasseler, USA) at 1500 rpm (Figure 4D). Among the most reliable contemporary systems, OptiBond FL is especially indicated for the application of IDS because of its ability to form a consistent and uniform layer (about 80 μm when placed over a slightly convex dentin surface) and its cohesiveness with the final luting composite.

The four posterior sextants were prepared and restored over a period of 15 days (two per week; maxillary arch first). In this regard, the additive stone replicas (without the canine waxing) were scanned first for correlation (Figure 5A) (Cerec AC Bluecam, Sirona Dental Systems) and then the preparations (Figure 5B). A preview of the restorative design was proposed after the correlation of the models in the software (InLab v4.0.2, Sirona Dental Systems) (Figure 5C). Restorations were made entirely in-house with the assistance of the design tools of the software (InLab v4.0.2) set in Biogeneric Copy. The design was proposed by correlating the

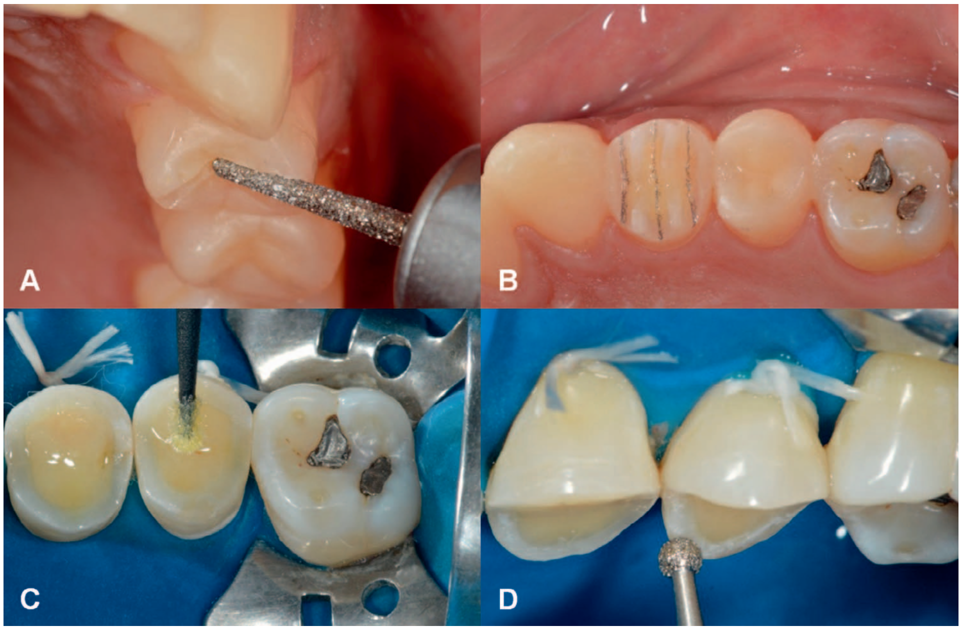

Figure 4. *(A): Preparation driven by provisional restorations. (B): Depth cuts are marked with pencil, remaining acrylic is removed, and preparation is completed when pencil marks are erased. (C): Immediate dentin sealing with a three-step etch-and-rinse dentin bonding agent (Optibond FL, NOT AIR-THINNED). (D): Removal of excess adhesive from instrumented enamel.*

preparations with the anatomy of the additive waxing. Minimum editing was needed to obtain precise margins and ideal contact strength. The ultrathin occlusal veneers were milled from lithium disilicate glass-ceramic blocks (A2 High Translucency e.max CAD). The sprue was preferably located at the nonworking cusps: lingual (inferior arch) and buccal (superior arch). In the same appointment, the restorations were visually inspected to detect eventual cracks and marginal chipping and, while in the precrystallized stage, tried in for occlusal contacts and general fit (Figure 6A).

Due to the nonretentive geometry of the preparation, provisionals were fabricated with some redundancy with respect to retention measures. The surrounding occlusal enamel was spot etched with 37.5% phosphoric acid (Ultra-Etch, Ultradent Products Inc, South Jordan, UT, USA) (Figure 6B) followed by coating protection of the previously sealed dentin surfaces with a water-soluble separating agent (Pro-V Coat, Bisco Dental Products, Schaumburg, IL, USA) (Figure 6C) in order to prevent potential resin bonding to the provisional poly(methyl methacrylate) resin (Dencôr Lay). The polyvinyl siloxane indexes (Platinum 85, Zhermack) were then loaded with the acrylic resin (Dencôr Lay) and precisely repositioned (Figure 6D). Provisionals were not retrieved, and excesses on the embrasures were purposely left in order to provide extra retention. Mandibular third molars were provisionalized during all restorative phases (although not planned for restoration) in order to avoid early supraeruption, which could compromise the process of correlation. Restorations were crystalized (Programat P300, Ivoclar Vivadent) and characterized (stains mahogany, copper, and white IPS e.max CAD) and finally glazed.

At the following appointment, the ultrathin occlusal veneers were luted without the need for anesthesia. Provisionals were removed, and the preparations were inspected for any remaining adhesive resin/acrylic resin. The conditioning of the restorations included 10% hydrofluoric acid etching (Dentsply) for 20 seconds. After rinsing for 20 seconds, the restorations were subjected to postetching cleaning using 37.5% phosphoric acid (Ultra-Etch) under motion for one minute, followed by air-water spray cleaning for 30 seconds. After air-drying, intaglio surfaces were silanated (Monobond Plus, Ivoclar Vivadent) and heat dried at 68°C for around five minutes (Calset, AdDent Inc, Danbury, CT, USA).

Under rubber dam, tooth preparations were airborne-particle abraded with 50 μm aluminum oxide at 0.2 MPa and etched for 30 seconds with 37.5% phosphoric acid (Ultra-Etch), rinsed, and dried. Both fitting surfaces, restoration and tooth, were coated with adhesive resin (Optibond FL, Bottle No. 2) and left unpolymerized until the preheated luting material (Z100, 3M ESPE) (preheated at 68°C with Calset, Adent) was applied to the tooth.[20] The restorations were seated (the entire sextant) followed by careful elimination of gross

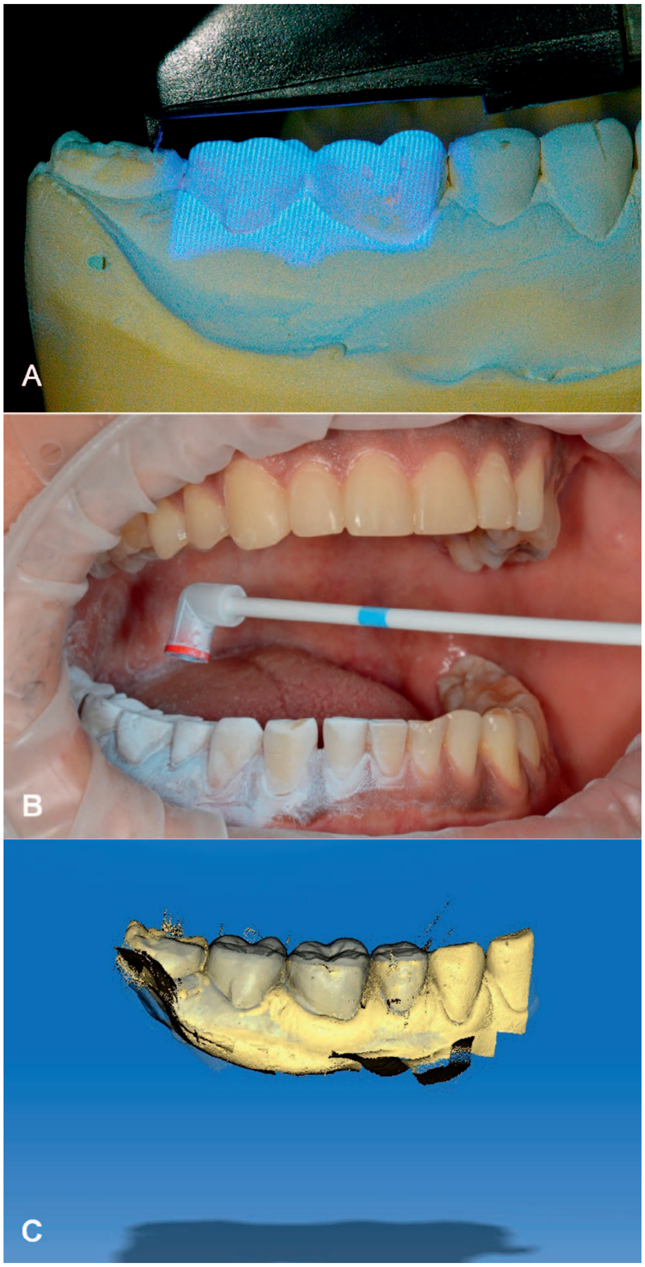

Figure 5. *(A): Scanning of wax-up replica. (B): Powdering of prepared teeth. (C): Preview of the restorative design after the correlation of the models. Note the excellent overlap between the wax-up and prepared teeth.*

excess composite resin and initial light polymerization.[21] Each surface was exposed at an irradiance of 1000 mW/cm^2 (Valo, Ultradent) for 60 seconds (20 seconds per surface repeated three times). All margins were then covered with an air barrier (K-Y Jelly,) and light polymerized for 10 seconds. Occlusal adjustments were minor due to the adjustments in the precrystallized stage (Figure 7). The margins were finished and polished at the following appointment first with silicon-impregnated rubber polishers (Jiffy, Ultradent) and, in case of minor horizontal discrepancy, with diamond ceramic polishers (W16Dg, W16Dmf, and W16D, EVE Diapol, EVE Ernst Vetter GmbH, Pforzheim, Germany). At this clinical stage, after MIP stabilization, the mandibular third molar provisionals were removed, allowing supraeruption and intercuspation of these teeth according to the Dahl principle.[17]

The anterior maxillary sextant was restored in the most conservative way: according to the bilaminar approach.[18] The palatal surface of the six teeth was rebuilt with direct composite under rubber dam isolation (including clamp #212). Preparation was limited to the refreshing of the exposed dentin with a diamond bur at low speed (1500 rpm). After the application of a total-etch dental adhesive (Optibond FL), the marginal ridges, cingulum, and palatal fossa were recovered with freehand composite resin application (Empress Direct, Ivoclar Vivadent, Figure 8A). If ceramic had been chosen, additional preparation of the palatal surface would have been needed. In the following two appointments, anterior teeth were prepared (Figure 8B), and monolithic stained CAD-CAM lithium disilicate–reinforced glass ceramic (e.max CAD) was fabricated (Figure 8C) and luted (Variolink Veneer, Ivoclar Vivadent). Finally, the incisal edges of the mandibular anterior teeth were restored with direct composite resin (IPS Empress Direct).

DISCUSSION

It is notable how well patients presenting with moderate to severe loss of tooth structure due to biocorrosion react when minimally invasive reconstructive approaches are proposed to them. Both biological and economic costs are significantly lower compared to traditional and more aggressive options, making the decision-making process easier and the acceptance rate higher. The diagnostic wax-up and mock-up play a key role in this matter, helping both patient and clinician assess the physical aspects of the proposal as well as in the following technical steps of the work flow. Despite the fact that digital design along with the possibility of 3D printing is already available, the wax-up was delegated to a skilled technician and performed in the traditional additive way.

The option of using the mock-up for a period of time (in the present case, two weeks) provides a good level of predictability, mainly when the VDO is augmented. Based on the study of Abduo,[19] the

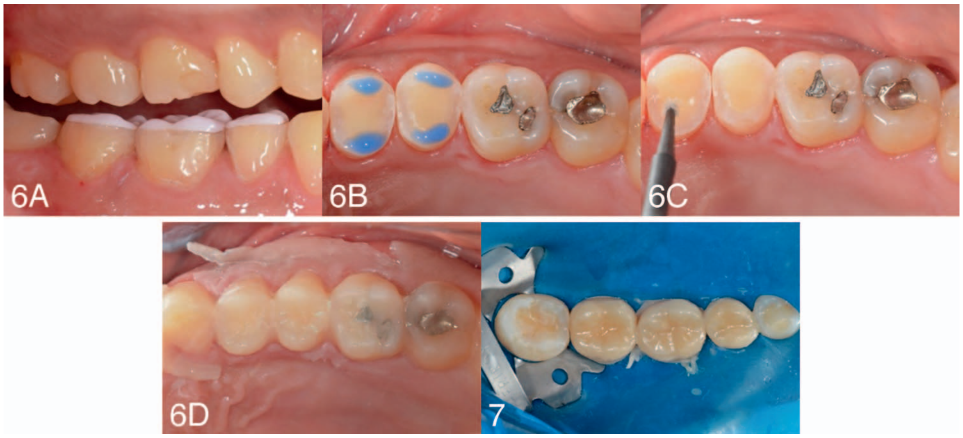

Figure 6. *(A): Try-in of ultrathin occlusal veneers in blue phase. (B): Spot etching of prepared enamel with 37.5% phosphoric acid provides extra retention for provisional restorations. (C): Separating agent (Pro V Coat) for selective retention of provisional. (D): Provisional splinted restoration still showing the excesses to be removed.*

Figure 7. *Luting completed in mandibular right posterior sextant.*

option of using the mock-up for two weeks provided a good level of acceptance with the VDO augmented in only 1 mm. Considering the two additional weeks to deliver the occlusal veneers, the total time of provisionalization was one month. Acrylic resin is the material of choice for provisionals because of its good fracture resistance compared to the bis-acryl resins, which is critical for ultrathin restorations. Additionally, one of its drawbacks (the high polymerization shrinkage) can be an advantage since it will help to keep the provisional locked. Having the confirmation of occlusal comfort, the same mock-up is used as a reference guide for an accurate preparation.

Regarding the bonding strategy, Optibond FL was the first choice for immediate dentin sealing. Its filler content allows for a more consistent and uniform layer compared to unfilled systems. This feature also decreases the chances of dentin exposure during cleaning and roughening procedures at the delivery appointment.[15] It was also used along with the direct composite because of the intrinsic advantages of a fourth-generation system and also in order to simplify the process using one system for all purposes.

The choice of a preheated traditional light-polymerizing composite resin as a luting agent is supported by clinical[22-24] and laboratory evidence[25] as well as by practical advantages: unlimited working time (compensating for the difficulty of positioning the occlusal veneers because of the lack of insertion path), less formation of interfacial voids because of the low viscosity,[26] ideal consistency for seating and excess removal, and better mechanical properties because of the higher filler content and higher degree of conversion.[1,20] In addition, preheated composite reached a high degree of conversion

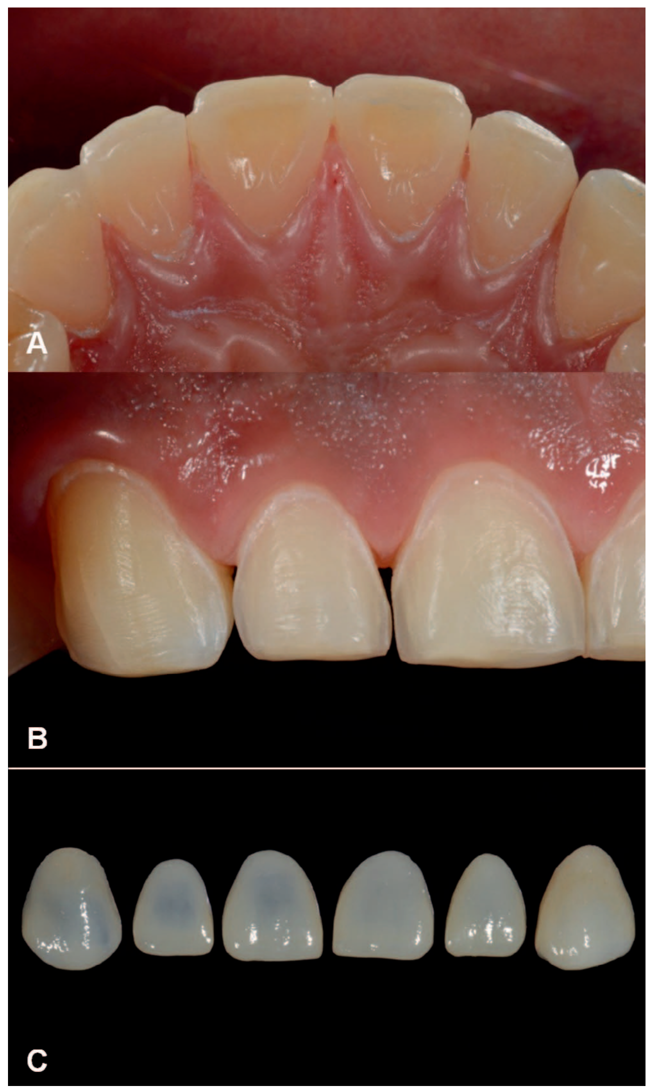

Figure 8. *(A): Palatal direct veneers (freehand composite, Empress Direct). (B): Facial veneer preparations. (C): Lithium disilicate veneers after staining/glazing.*

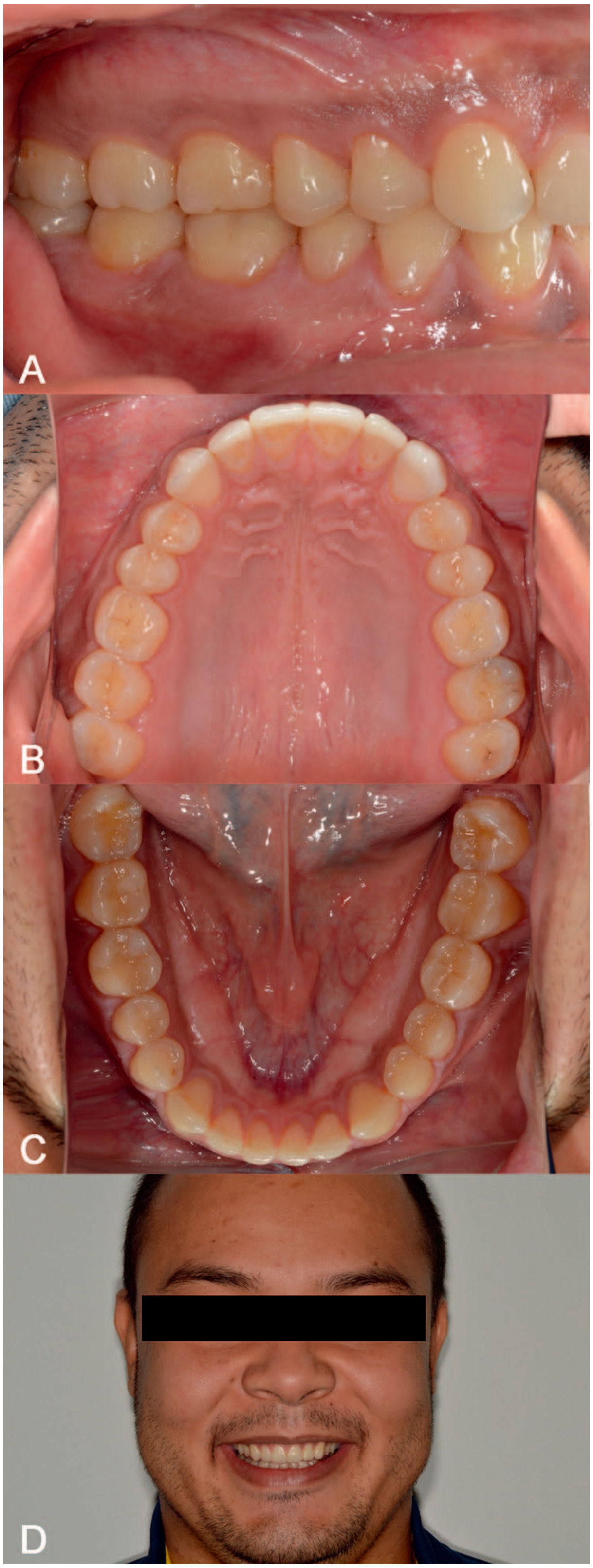

Figure 9. *Right (A) sextant in occlusion. Occlusal views of the completed restorations (B,C). Patient's smile after treatment conclusion (D).*

using low radiant exposures, between 50% to 70%, compared to composite polymerized at room temperature.[27]

When investigating the material to fabricate ultrathin occlusal veneers, both ceramic and composites were able to meet the requirements for mechanics, function, and esthetics under an *in vitro* accelerated fatigue study[5] that was validated by numeric simulation.[6] However, CAD-CAM composite resins may provide better fracture resistance under extreme load conditions.[5] In these patients, it is highly recommended to use an occlusal splint regardless of the restorative material. Further research is required to assess the clinical performance of those novel-design ultrathin occlusal veneers. For this reason, the case presented here is part of a comprehensive clinical trial ongoing at the Dental School of the Federal University of Rio de Janeiro. Patients affected by moderate to severe biocorrosion are being randomly treated with this novel design using two different CAD-CAM materials (composite resin and ceramic).

Clinical Follow-Up

The intraoral aspects of the patient can be observed before treatment (Figure 1A through 1C), after treatment completion (Figure 9A through 9E), and after 1.5 years of treatment (Figure 10A through 10D).

CONCLUSIONS

This case report demonstrates the feasibility of restoring the dental sequelae of moderate biocorrosion with ultrathin CAD-CAM ultrathin occlusal veneers and anterior bilaminar veneers. The treatment was successful due to the conservation of the dental tissue, esthetics, and effectiveness to restore dental wear caused by biocorrosion confirmed by the reevaluation after 1.5 years of clinical service, although it has been observed that addressing the etiologic factor along with the use of an occlusal splint (when associated to attrition) is of paramount importance.

Acknowledgements

The authors wish to express their gratitude to FAPERJ for the research grant E-26/112.046/2012; the Federal University of Rio de Janeiro for the inLab MC XL milling unit; Dr. Silvana Marques Miranda Spyrides (chair, Department of Prosthodontics and Dental Materials, School of Dentistry, Federal University of Rio de Janeiro) for her support on building the new CAD-CAM laboratory as well as the buying process of the milling unit MCXL through the university; Sirona Brazil for the discount for the Cerec System and for the Hugo stool; Mr

Figure 10. *1.5-year follow-up. (A): Restorations well integrated in the smile. (B) Palatal view of the anterior teeth. Note the subtle blending between composite - ceramic. (C-D): Lower posterior teeth (no signs of cracks or chipping in the restorations).*

Holger Kappler (Kappler) for the discount on the Cerec MCXL cabinet; Mr Herbert Mendes and Dr Camila Madruga (Ivoclar Vivadent) for the Variolink Veneer Kit and Empress Direct and also for the discount on IPS e.max CAD blocks and the Programat P300 oven and other dental materials from Ivoclar; Mr Rodrigo Negreiros (3M ESPE) for Protemp 4; Dr Joshua Friedman (AdDent) for Calset and Microlux; Dr Byoung Suh (Bisco Dental Products) for Pro-V Coat; Dr Richard Tuttle (Ultradent) for Ultra-Etch, Ultrapak, Opalescence 10%, Jiffy Kit; Ms Leigh Anne Jones (territory manager, Kerr Restoratives) for Optibond FL and Kolor + Plus; Dr Gabriela Lomeu for assisting during the restoration of the anterior maxillary teeth; and Mr Arno Egon Gressler (Dental Design - Caxias do Sul, Brazil) for the diagnostic wax-up. This work was supported by grant E-26/112.046/2012 from FAPERJ (Carlos Chagas Filho Foundation for the Support of Research in the State of Rio de Janeiro).

Regulatory Statement

This study was conducted in accordance with all the provisions of the local human subjects oversight committee guidelines and policies of the Universidade Federal do Rio de Janeiro.

Conflict of Interest

The authors of this article certify that they have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

(Accepted 5 August 2017)

REFERENCES

1. Magne P & Belser U (2002) *Bonded Porcelain Restorations in the Anterior Dentition: A Biomimetic Approach* Quintessence Publishing, Chicago.

2. Grippo JO (2012) Biocorrosion vs. erosion: The 21st century and a time to change. *Compendium of Continuing Education in Dentistry* **33(2)** e33-e37.

3. Lussi A, Hellwig E, Ganss C, & Jaeggi T (2009) Buonocore memorial lecture. Dental erosion *Operative Dentistry* **34(3)** 251-262.

4. Barron RP, Carmichael RP, Marcon MA, & Sàndor GK (2003) Dental erosion in gastroesophageal reflux disease *Journal of the Canadian Dental Association* **69(2)** 84-89.

5. Schlichting LH, Maia HP, Baratieri LN, & Magne P (2011) Novel-design ultra-thin CAD/CAM composite resin and ceramic occlusal veneers for the treatment of severe dental erosion *Journal of Prosthetic Dentistry* **105(4)** 217-226.

6. Magne P, Stanley K, & Schlichting LH (2012) Modeling of ultrathin occlusal veneers *Dental Materials* **28(7)** 777-782.
7. Tinschert J, Natt G, Mautsch W, Augthun M, & Spiekermann H (2001) Fracture resistance of lithium disilicate-, alumina-, and zirconia based three-unit fixed partial dentures: A laboratory study *International Journal of Prosthodontics* **14(3)** 231-238.
8. Beuer F, Schweiger J, & Edelhoff D (2008) Digital dentistry: An overview of recent developments for CAD/CAM generated restorations *British Dental Journal* **204(9)** 505-511.
9. Leinfelder KF (2001) Ask the expert. Will ceramic restorations be challenged in the future? *Journal of the American Dental Association* **132(1)** 46-47.
10. Manhart J, Chen H, Hamm G, & Hickel R (2004) Buonocore memorial lecture. Review of the clinical survival of direct and indirect restorations in posterior teeth of the permanent dentition *Operative Dentistry* **29(5)** 481-508.
11. Leinfelder KF (2005) Indirect posterior composite resins *Compendium of Continuing Education in Dentistry* **26(7)** 495-503.
12. Spreafico RC, Krejci I, & Dietschi D (2005) Clinical performance and marginal adaptation of class II direct and semidirect composite restorations over 3.5 years in vivo *Journal of Dentistry* **33(6)** 499-507.
13. Magne P, & Douglas WH (1999) Porcelain veneers: Dentin bonding optimization and biomimetic recovery of the crown *International Journal of Prosthodontics* **12(2)** 111-121.
14. Dietschi D, Monasevic M, Krejci I, & Davidson C (2002) Marginal and internal adaptation of class II restorations after immediate or delayed composite placement *Journal of Dentistry* **30(5-6)** 259-269.
15. Magne P (2005) Immediate dentin sealing: A fundamental procedure for indirect bonded restorations *Journal of Esthetic and Restorative Dentistry* **17(3)** 144-154.
16. Schlichting LH, Resende TH, Reis KR, & Magne P (2016) Treatment of severe dental erosion with ultra-thin CAD/CAM composite occlusal veneers and anterior bilaminar veneers: A clinical report *Journal of Prosthetic Dentistry* **116(4)** 474-482.
17. Magne P, Magne M, & Belser UC (2007) Adhesive restorations, centric relation, and the Dahl principle: Minimally invasive approaches to localized anterior tooth erosion *European Journal of Esthetic Dentistry* **2(3)** 260-273.
18. Vailati F, & Belser UC (2011) Palatal and facial veneers to treat severe dental erosion: A case report following the three-step technique and the sandwich approach *European Journal of Esthetic Dentistry* **6(3)** 268-278.
19. Abduo J (2012) Safety of increasing vertical dimension of occlusion: A systematic review *Quintessence International* **43(5)** 369-379.
20. Daronch M, Rueggeberg FA, De Goes MF, & Giudici R. (2006) Polymerization kinetics of pre-heated composite *Journal of Dental Research* **85(1)** 38-43.
21. Wilson PR (1996) Low force cementation *Journal of Dentistry* **24(4)** 269-273.
22. Krämer N, & Frankenberger R. (2000) Leucite-reinforced glass ceramic inlays after six years: Wear of luting composites *Operative Dentistry* **25(6)** 466-472.
23. Schulte AG, Vöckler A, & Reinhardt R. (2005) Longevity of ceramic inlays and onlays luted with a solely light-curing composite resin *Journal of Dentistry* **33(5)** 433-442.
24. Krämer N, & Frankenberger R. (2005) Clinical performance of bonded leucite-reinforced glass ceramic inlays and onlays after eight years *Dental Materials* **21(3)** 262-271.
25. Goldberg J, Güth JF, & Magne P. (2016) Accelerated Fatigue Resistance of Thick CAD/CAM Composite Resin Overlays Bonded with Light- and Dual-polymerizing Luting Resins *Journal of Adhesive Dentistry* **18(4)** 341-348.
26. Lee JH, Um CM, & Lee IB (2006) Rheological properties of resin composites according to variations in monomer and filler composition *Dental Materials* **22(6)** 515-526.
27. Daronch M, Rueggeberg FA, De Goes MF, & Giudici R. (2006) Polymerization kinetics of pre-heated composite *Journal of Dental Research* **85(1)** 38-43.