

Restoration of Anterior Dental Erosion with a Combination of Veneers and Crowns: A 3-Year Case Report

Amara Abreu, DDS, MSD*; M. Bryan Rucker, CDT†; Maria A. Loza, DMD, MS‡; William W. Brackett, DDS, MSD§

This report describes the conservative management of a 40-year-old female patient with smooth, eroded facial enamel affecting her maxillary anterior and some posterior teeth. Using conventional enamel bonding, pressed leucite-reinforced laminate veneers were used to restore the length, contour, and esthetics of the maxillary right canine, as well as of the right lateral and both central incisors; at the same time, it was necessary to restore the maxillary left lateral incisor, canine, and first premolar of the same quadrant with all-ceramic crowns of the same material. The patient has been followed for 3 years and demonstrates a good esthetic outcome with no shade discrepancy between the two types of restoration. Apparently, the tooth structure, though eroded, was able to provide an adequate bonding substrate for these adhesive restorations. [*P R Health Sci J* 2015;34:222-224]

Key words: Dental erosion, Enamel bonding, Pressed ceramic crown, Pressed ceramic laminate veneer

Because of the difficulty of matching shade and translucency in restorations of differing thicknesses, clinicians struggled for many years to restore the maxillary anterior dentition using a combination of crowns and veneers. Crystalline-reinforced glass ceramics now allow for the fabrication of both of these restorations using the same material, with no opaque substructure in the crowns to affect appearance.

Dental erosion, the loss of superficial tooth structure by chemical action, is considered to be multifactorial in origin (1-5). Restoring eroded teeth is a challenge because of the modified substrate (6-8). The effect of erosion on the resin-to-enamel bond has not been investigated; however, results concerning the long-term efficacy of bonding to eroded dentin are contradictory when examined in terms of bond strength (9,10).

Clinical Case Report

A 40-year-old female presented for consultation with the prosthodontist regarding the appearance of her teeth. She had smooth, eroded facial enamel affecting her maxillary anterior and some of her posterior teeth (Fig. 1).

The patient was in good health. She denied frequent consumption of acidic beverages or other sources of dietary acid, but had a history of swimming and practicing water sports in a chlorinated pool at least once a month. Periodontal findings were within normal limits. The mandibular anterior teeth showed minimal wear, but mild to moderate wear was noted on the occlusal surfaces of the maxillary and mandibular posterior teeth.

Detailed occlusal analysis revealed heavier maximal intercuspal contact (MI) on some posterior teeth and minor working and non-working posterior interference during excursive movements. Clinical and cast assessment revealed that tooth positions and gingival levels were esthetically acceptable.



Figure 1. Initial appearance of patient: loss of tooth structure through erosion, resulting short maxillary canines and central incisors.

*Assistant Professor, Department of Oral Rehabilitation, College of Dental Medicine, Georgia Regents University of Augusta, USA; †Dental Laboratory Supervisor, Department of Oral Rehabilitation, College of Dental Medicine, Georgia Regents University of Augusta, USA; ‡Professor, Restorative Sciences Department, School of Dental Medicine, University of Puerto Rico Medical Sciences Campus, San Juan PR; §Professor, Department of Oral Rehabilitation, College of Dental Medicine, Georgia Regents University of Augusta, USA

The authors have no conflicts of interest to disclose.

Address correspondence to: Amara Abreu, DDS, MSD, 1430 John Wesley Gilbert Dr., Augusta, GA 30912. Email: aabreu@gru.edu

Initial therapy consisted of wearing a splint for 2 months and occlusal adjustment to achieve uniform MI contacts and the removal of posterior interferences. New records were taken and a diagnostic wax-up made. Modifications included to increase the lengths and thicknesses of the facial contours of the maxillary anterior teeth, with incisal edge positions based on the position of the lower lip at full smile. The treatment plan included pressed labial veneers on the maxillary right canine, the right lateral, and both central incisors; pressed all-ceramic crowns on the maxillary left lateral incisor, canine, and first premolar of the same quadrant; and a zirconia all-ceramic crown on the maxillary left first molar. A composite on the buccal surface of maxillary left second premolar was also planned.

After the patient consented to treatment, the tooth preparations were completed. Veneer preparations were maintained in enamel with chamfer margins on the lingual surfaces. Reduction was limited to the amount that would yield an incisal edge thickness of 1.5 mm of porcelain in the final restorations. Crown preparations were made allowing 2 mm of incisal edge thickness and 1.5 mm of facial thickness in the final restorations, with a 1 mm margin width. Reduction for both types of preparation was evaluated relative to a matrix formed on the diagnostic wax-up.

After a 1-month period of wearing provisionals, during which no dental or myofascial symptoms were experienced, final impressions were made (Extrude® Extra, Kerr Corporation, Orange, CA, USA). The die system was mounted. Shade B1 (VITAPAN Classical Shade Guide, VITA Zahnfabrik H. Rauter GmbH & Co. KG, Bad Säckingen, Germany) was selected. In anticipation of the need to modify shades with resin composite luting cement, a generous layer of die spacing was used prior to the fabrication of the wax patterns for veneer restorations.

All restorations were fabricated by pressing leucite-reinforced glass ceramic (IPS Empress®, Ivoclar Vivadent Inc., Amherst, NY, USA), which was found to best match the shade and translucency of the patient's teeth. During the insertion appointment, proximal contacts, margins, and occlusion were all verified and slightly adjusted.

By using try-in paste, the prosthodontist was able to ascertain that the same shade of cement could be used for all the restorations (Yellow; NX3 Nexus®, Kerr Corporation). Cementation, including the treatment of the teeth, was completed according to the manufacturer's recommendations. First, the veneers were inserted using the light-cured version of the resin cement. The ceramic crowns were then cemented using the dual-cured version of the same cement. The occlusion was re-evaluated and the adjusted areas were polished. The patient was given detailed oral hygiene instructions and received a temporary splint 48 hours later (Fig. 2).

Six weeks later, a Procera all-ceramic crown (Nobel Biocare USA, LLC, Yorba Linda, CA, USA) was cemented on the maxillary left first molar using a RMGI cement (RelyXTM Luting Plus, 3M ESPE Dental Products, St. Paul, MN, USA). Resin composite was added to the buccal surface of maxillary

left second premolar to harmonize tooth contours. The patient received an acrylic splint for nightly use.



Figure 2. Restorations at 1 month; acceptable shade matching between crown and veneer restorations.

The patient has been seen for annual recalls since the insertion date. No shade mismatch is evident between the veneers and adjacent crowns, and the occlusion is stable (Fig. 3).



Figure 3. Restorations at 3 years; esthetic appearance maintained.

Discussion

Porcelain veneers are a popular and conservative treatment. The strength and durability of the bonds between porcelain, cement, and the enamel/dentin interface is a determining factor in the success of this treatment (11). In patients with dental erosion, the selection of the cementing agent and the bonding system is even more critical, since each bonding system acts differently because of the variability of each one's mode of action; in addition, the altered mineral content of the eroded dentin might also affect the performance of the bonding agent (6). Variations in the mineral composition and the dentin structure may also modify the way each tooth responds to the erosion process (7).

Leucite-reinforced ceramic was chosen because of its appearance; however, it admittedly is not as strong as lithium disilicate-reinforced ceramic. The authors do not recommend the use of this material distal to the premolars and, in fact, elected to use a zirconia substructure for the restoration of the maxillary molar.

This case suggests that adjacent crown and veneer restorations can be made of the same material and effectively match in color and translucency, at least for a light shade in a patient with no

tooth discoloration. If the patient's teeth had been dark or had not been uniform in color, home bleaching would likely have been indicated before restoration, since veneers are too thin to adequately mask such teeth.

It also appears that bonding to eroded enamel and dentin can adequately stabilize veneers as long as an appropriate protocol is followed.

Resumen

El presente artículo describe el manejo conservador de una paciente femenina de 40 años con erosión dental lisa en el área facial afectando los maxilares anteriores y algunos dientes posteriores. Para reconstruir el largo, el contorno y la apariencia del canino maxilar e incisivo lateral derecho y ambos incisivos centrales, se usó adhesión dental convencional con carillas de porcelana prensada reforzada con leucita. De igual forma, para restaurar el incisivo lateral maxilar izquierdo, canino y primer premolar del mismo cuadrante, fue necesario usar coronas cerámicas del mismo material. Se le ha dado seguimiento al caso durante tres años, demostrando un resultado estético adecuado sin discrepancia de color entre los dos tipos de restauración. Al parecer, el esmalte dental erosionado ha resultado un substrato adecuado para proporcionar adhesión eficaz a este tipo de restauraciones adhesivas.

References

1. Lussi A, Jaggi T, Scharer S. The influence of different factors on in vitro enamel erosion. *Caries Res* 1993;27:387-393.
2. Lussi A, Jaeggi T, Zero D. The role of diet in the aetiology of dental erosion. *Caries Res* 2004;38 suppl 1:s34-s44.
3. Phelan J, Rees J. The erosive potential of some herbal teas. *J Dent* 2003;31:241-246.
4. Geurtsen W. Rapid general dental erosion by gas-chlorinated swimming pool water. Review of the literature and case report. *Am J Dent* 2000;13:291-293.
5. Lussi A, Carvalho TS. Erosive tooth wear: a multifactorial condition of growing concern and increasing knowledge. *Monogr Oral Sci* 2014; 25:1-15.
6. Turgut MD, Zimmerli B, Lussi A. Influence of dentinal erosion on shear bond strength of composite restorations with different bonding systems [in Turkish]. *Hacettepe Diş Hekimliği Fakültesi Dergisi* 2008;32: 34-44.
7. Pashley DH, Sano H, Ciucchi B, Yoshiyama M, Carvalho RM. Adhesion testing of dentin bonding agents: a review. *Dent Mater* 1995;11:117-125.
8. Barbour ME, Lussi A. Erosion in relation to nutrition and the environment. *Monogr Oral Sci* 2014;25:143-154.
9. Kwong SM, Cheung GSP, Kei LH, et al. Micro-tensile bond strengths to sclerotic dentin using a self-etching and a total-etching technique. *Dent Mater* 2002;18:359-369.
10. Cruz JB, Lenzi TL, Tedesco TK, Guglielmi C de A, Raggio DP. Eroded dentin does not jeopardize the bond strength of adhesive restorative materials. *Braz Oral Res* 2012;26:306-312.
11. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G. Porcelain veneers: a review of the literature. *J Dent* 2000;28:163-177.