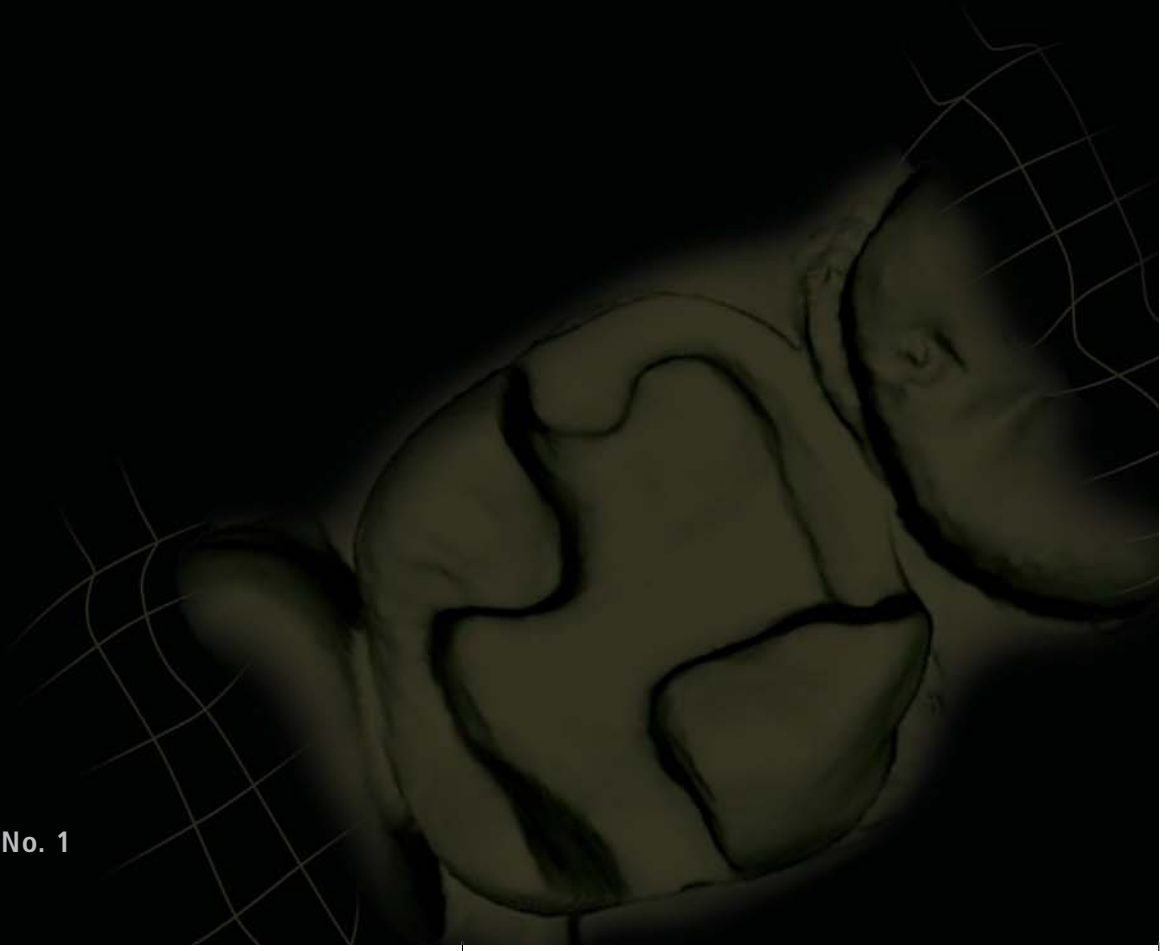
Figure 1. Preoperative view of tooth #8(11), which is rotated well out in front of the other teeth.

Figure 2. Teeth are rotated, showing crowding and thin lips as viewed prior to treatment.

Figure 3. Rampant decay exists and the patient desires aesthetic enhancement of her smile. Cervical decay was present on several teeth.



Smile Rehabilitation with CAD/CAM Veneers to Correct Rampant Decay

Jack D. Griffin, Jr, DMD*

Anterior destruction from poor hygiene associated with drug abuse can lead to poor self-esteem and decrease the potential for long-term rehabilitation. Restorations, fabricated via the CEREC process, recently have found favor for aesthetic anterior indications as a result of their improved fit, porcelain milling, and efficient staining and glazing techniques. This article demonstrates these advantages in a patient requiring 8 anterior CAD/CAM veneers using an alternating tooth format with CEREC correlation.

Rampant tooth decay is associated with many different factors. Every clinician should be conscious of clinical signs of drug abuse and its manifestation of associated tooth degradation.[1] The professional must be prepared to intervene with dental treatment as well as manage the psychological and systemic effects that may alter normal treatment.[2]

Cosmetic dental care is often sought when the drug abuse has been controlled and the patient becomes more aware of his or her appearance and overall health.[3] Pain or compromised function may be secondary in importance to the psychological damage and loss of self esteem resulting from the patient's smile deficiencies.[4] Pain management, caries repair, improved function, and smile enhancement can be instrumental in the clinician's effort to improve patient health and bolster self-confidence.

Case Presentation

Examination and Treatment Plan

A female patient presented for aesthetic enhancement (Figures 1 through 3). She had a previous history of drug abuse but had not used drugs for several years. Clinical examination revealed widespread decay interproximally and facially. There were areas of 2 mm to 4 mm recession, and tooth #21(34) was out of the arch buccally with a poor prognosis. The anterior teeth were rotated and all had decay. All-ceramic restorations (ie, CEREC 3D, Sirona Dental Systems, Charlotte, NC) were treatment planned for teeth #6(13) through #11(23). Due to financial limitations, no posterior porcelain restorations were planned at this time, and porcelain restorations for the maxillary first premolars would be postponed for at least 1 year.

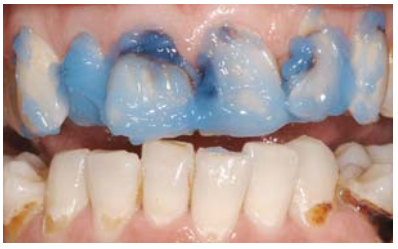


Figure 4. To begin the mockup, the teeth were etched and rinsed before composite placement.

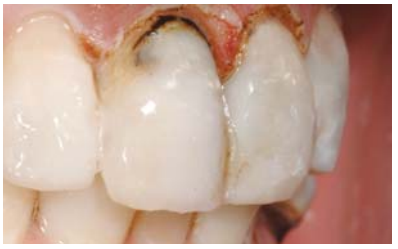


Figure 5. Laser recontouring was accomplished to enhance tissue shape and symmetry as well as improve the crown ratios for the central incisors.

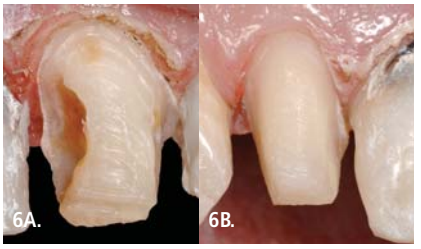
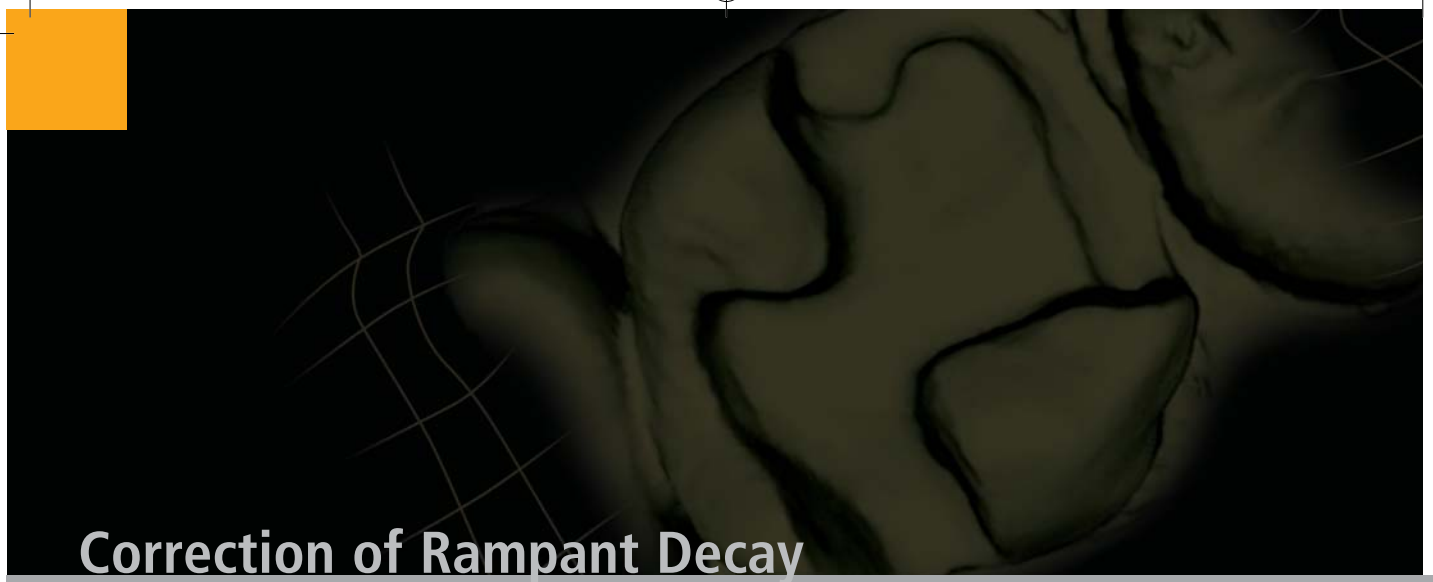


Figure 6A. Preparation was initiated after the mockup of tooth #9(21) and the adjacent teeth were scanned. **6B.** Completed buildup of the preparation.



Correction of Rampant Decay

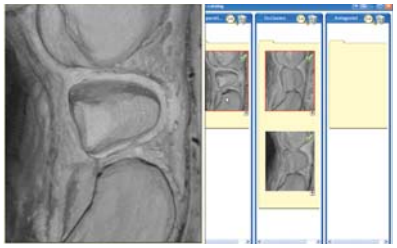
Figure 7. The CEREC desktop shows the prepared tooth and the mockup, which was recorded twice here.

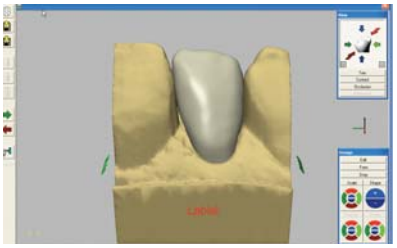
Figure 8. The CAD/CAM software used the mock-up anatomy to create tooth form. Fine adjustments were made via the CEREC software.

Figure 9. After teeth #7 and #9 were milled, their cant and proportions were verified and corrected before tooth #8 was accomplished.

Aesthetic Preview and Tissue Contouring

An intraoral mockup, created via a direct resin technique, was used to aid in the determination of incisal edge position for proper phonetics and aesthetics.[5,6] The teeth were etched with 37% phosphoric acid to ensure the materials would remain bonded during fabrication of the CAD/CAM restorations (Figure 4). A diode laser was used to enhance gingival contours, to create favorable emergence profiles for the central incisors, and to improve the symmetry of the restorations (Figure 5).[7]





Predictability

Restorative Procedure

When restoring multiple anterior teeth—as accomplished herein using the "Correlation" mode—the author has found it most efficient to correlate, prepare, and design every other tooth. This allows the clinician to maintain the mockup on the adjacent teeth for accurate correlation. When a mocked-up tooth has two adjacent milled CEREC restorations, those restorations are then used as the correlation neighbors.

A glycerin-based dusting adhesive was applied with a brush, and a titanium dioxide reflective medium was blown onto tooth #9(21) and its adjacent teeth. This mockup image was then captured by the CEREC 3D acquisition unit. Tooth #9 was prepared first (Figure 6A); the carious defect was filled with dentin bonding and composite (Figure 6B). The application of the adhesive liquid and powder was repeated on the tooth after preparation, and the image was acquired by the CAD/CAM camera. Design and milling of the porcelain (ie, Vita Mark II, Vident, Brea, CA) required approximately 15 minutes. While #9 was milling, tooth #7(12) was prepared in the same exact way (Figure 7). The margins were identified, and the adjacent teeth were digitally trimmed from the model of the virtual preparation die (Figure 8).

While tooth #7 was prepared and designed, tooth #9 had finished milling. As tooth #7 was milling, the process was repeated for tooth #10(22). Porcelain was set on the central incisor so that its morphology could be used to construct tooth #10 and to keep orientation consistent with the preview. Teeth #9 through #11 were powdered and scanned into the computer; the correlate in this case involved both milled porcelain and composite mockup. Once the lateral incisor was prepared, porcelain was replaced on tooth #9, and the preparation and adjacent teeth were powdered and scanned into the acquisition unit. Milling was then accomplished for tooth #10.

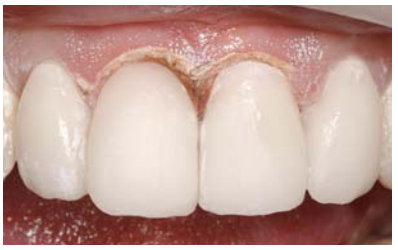
When porcelain was milled for teeth #7 and #8(11), they were placed on the tooth, powdered, and imaged into the computer along with the next tooth (#8) to be prepared (Figure 9). During the initial try-in of all four incisors, the contacts, embrasures, facial contours, and incisal character were adjusted using a high-speed handpiece, water irrigation, and a fine finishing diamond (Figure 10).

Customization and Cementation

Custom staining and glazing were done using the Vita Akzent (Vident, Brea, CA) customization kit. Once stain was added to the four incisors, a coat of glazing agent was applied and baked in the oven while the canines were being designed and milled. The surface glaze also provided a smooth surface that would reduce opposing tooth wear as well as seal scratches on the milled surface, which could lead to crack propagation and subsequent porcelain fracture.[8]

The lips were retracted, and teeth were scrubbed with alcohol to remove powder adhesive, powder, and salivary proteins that could interfere with higher bond strengths (Figure 11). The teeth were then prepared for 30 seconds with 37% phosphoric acid, and a dentin bonding agent was applied and air thinned. Hydrofluoric acid etching was applied to the porcelain for 2 minutes and followed by silane application. A dual-cure bonding agent was then applied and air thinned on the veneers. Clean up was performed with brushes, scalers, floss, and gauze prior to curing.

The patient was scheduled for a follow-up in 3 days to check healing and make adjustments as necessary (Figure 12). The patient was pleased with the aesthetic enhancement of her smile. At one week, the tissues were nearly healed and the patient experienced no pain. The tissues were recovering well, and the patient was pleased with the outcome of treatment. Posterior restorations began at this time, as did the extraction of the patient's third molars and tooth #21.



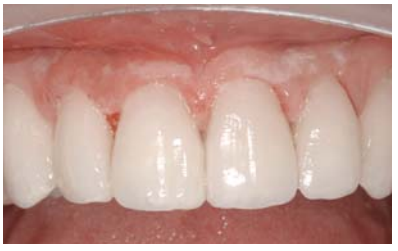


Figure 10. Once all four incisors were milled, they were tried in. Basic refinement was performed with a finishing diamond.

Figure 11. The teeth were rinsed and scrubbed to eliminate any adhesive that may have interfered with tooth bonding.

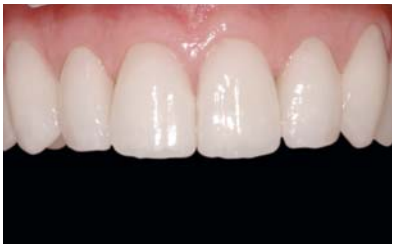


Figure 12. The contours and customization were solely the responsibility of the office staff. Despite seeing areas of imperfection, the case was acceptable.

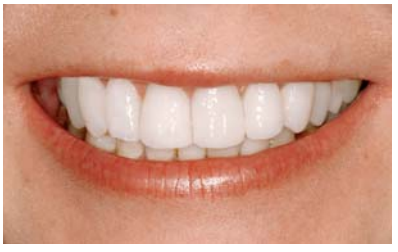


Figure 13. At two years postoperatively, the aesthetic enhancement achieved via the CEREC process was evident.

Figure 14. The patient was extremely satisfied with the outcome, contributing to her overall confidence.

Maintenance and Follow-Up

A splint was fabricated to help protect the porcelain restorations from potential parafunctional habits. The patient returned after 15 months for additional restorative work. Conservative preparations were performed, and CEREC restorations were fabricated for the first premolar teeth using the correlation technique described above. Almost 2 years after beginning, the rehabilitation was completed and the patient was pleased with her enhanced appearance (Figures 13 and 14).

Discussion

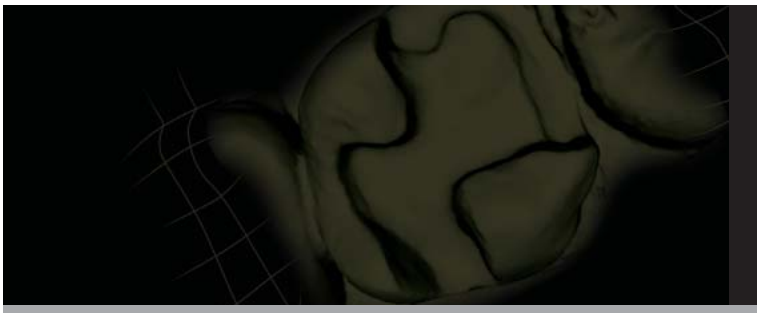
CEREC technology enables the predictable restoration of the posterior quadrant via the fabrication of inlays, onlays, and full-coverage crowns.[9] Additionally, the success of veneers created with this system has begun to rival other laboratory-fabricated porcelain restorations.[10] Anterior CEREC restorations, like posterior restorations, have exceptional fit but can be more demanding because of the aesthetic limitations of porcelain blocks and the increasing expectations found in today's dental patients. These restorations can be both aesthetic and functional and are a viable option when considering among direct resins and other laboratory-fabricated porcelain restorations.[11]

Conclusion

The results met the expectations of the patient and significantly improved her self-confidence. A more aesthetic result would have been obtained if the porcelain had been cut back to enable additional incisal characterization to be rendered, an unfeasible option given the financial limitations of the patient. Most importantly, the single-visit CAD/CAM restorations delivered via the CEREC 3D enhanced the patient's self-esteem and may contribute to her long-term desire to remain free of drug use and to maintain optimal health—and that in itself makes the case perfect.

*Private practice, Eureka, MO.

The author declares no financial interest in products, materials, or suppliers referenced herein.



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