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Revolutionizing In-office Care With IPS e.max CAD Abutment Solutions

By Darin O'Bryan, D.D.S.

Implant Restorations: A Historical Perspective

By Pete Gardell, D.D.S.

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A Full-mouth Rehabilitation

Meeting Cosmetic Demands with CEREC Omnicam

PATIENTS WHO HAVE RECEIVED PIECE-meal dentistry over the course of many decades are frequently left with a disharmonious and unesthetic smile. Even though it is the desire to improve their cosmetics that often drives these patients to seek treatment, a thorough examination and diagnosis is still needed to ensure the restorative designs and materials chosen are a balance of a three-part goal: arresting all disease processes; preserving maximal sound tooth structure; and providing high-strength restorations.

As demonstrated with this case study, meeting a patient's cosmetic demands with high-quality restorations that provide functional longevity is a goal that can be beautifully reached by the CEREC doctor. The following will detail the step-by-step process of diagnosis, design, long-term provisionalization and delivery of the final restorations of a full-mouth cosmetic rehabilitation completed using Sirona's CEREC Omnicam and Ivoclar's CAD/CAM restorative materials.

CASE STUDY

A 66-year-old female with no significant medical history presented to our office stating she was finally ready to "fix [her] teeth." A more in-depth interview with the patient revealed she was very unhappy with the esthetics of her smile, and she desired a whiter-yet-natural smile that was more balanced. As with every patient, a comprehensive digital photographic series was taken for documentation and diagnostic purposes. Analysis of these photos with the patient highlighted many cosmetic challenges apparent in her



current smile, particularly the presence of disharmonious gingival levels, improper tooth angulations, unsightly show-through of many metal margins and a multitude of old restorative materials of varying shades (Fig. 1). A review of these findings, along with those from a comprehensive dental examination and the patient's radiographs, revealed recurrent decay, failing restorations and cosmetic challenges that would require the patient to have every tooth treated in order to best address her cosmetic goals

Fig. 1: Pre-operative diagnostic photographic series

Fig. 2: Diagnostic wax-up

Fig. 3: Acrylic jigs in place to maintain desired restorative vertical dimension of occlusion

Fig. 4: Biocopy scan of patient's chairside provisional

Fig. 5: Maxillary CEREC Omnicam full-arch digital impression

Fig. 6: Stitched Biocopy and tooth scans





and restore health to her dentition. This proposal — full-mouth cosmetic rehabilitation — was immediately accepted by the patient, given her high degree of motivation.

Treatment started much in the same manner as with any full-mouth reconstruction — with the making of diagnostic impressions and records for case evaluation and ultimately the fabrication of an esthetic diagnostic wax-up (Fig. 2). Review of the mounted diagnostic casts revealed treatment would benefit from increasing the patient's vertical dimension by 2 mm to idealize the amount of restorative space available. The patient was given a removable bite splint appliance which she wore for six weeks to confirm she could tolerate the planned

increase in her vertical dimension. Only at this point in time was a diagnostic wax-up completed with an anterior guidance occlusal scheme to the desired new restorative vertical dimension of occlusion. The diagnostic wax-up was critical to best predicting the realistic cosmetic improvement the patient could expect. It was also useful in producing a stent from which chairside provisional restorations could be made. The patient then presented for a lengthy treatment visit completed under oral conscious sedation in which both the maxilla and mandible were prepped entirely.

The preparation design for each tooth was dictated by both the desire to maintain as much healthy tooth structure as possible and keep the previous restorations present.

Keeping in mind that the desired rehabilitation would increase the patient's vertical dimension of occlusion, three acrylic jigs were made to this new position (Fig. 3). The right side of both arches was then prepared, and the corresponding acrylic jig relined onto the preparations to ensure the desired restorative vertical dimension of occlusion was maintained. The left side of both arches was then prepared and the corresponding jig relined onto the preparations to the desired restorative vertical dimension. Chairside provisionals were then fabricated from Luxatemp (DMG) using putty stents of the diagnostic wax-up. The previously discussed acrylic jigs were used during the fabrication of the chairside provisionals to ensure maintenance of the new vertical dimension of occlusion. The patient was then dismissed without any complications.

Over the next several weeks, the patient was evaluated for occlusal harmony, proper phonetics and overall cosmetic satisfaction with her "new smile." Enough cannot be said about the importance of having the patient

functionally comfortable and operating within her entire envelope prior to proceeding with treatment.

The patient then presented for an appointment to complete a full-arch Omnicam scan of the maxilla. A full-arch Biocopy scan of the patient's existing chairside provisionals was first made to digitally record their confirmed cosmetics and occlusion with great accuracy (Fig. 4). The teeth preparation designs were then rounded, smoothed and finalized to ideal for CEREC treatment. Various tools were used to best achieve gingival retraction for optical

Enough cannot be said about the importance of having the patient functionally comfortable and operating within her entire envelope prior to proceeding with treatment.

recording. Specifically, a diode laser was used in some areas to trough hyperplastic tissues. In other areas, retraction cord was placed to allow for margin visualization. Lastly, hemostasis was controlled for with 3M retraction paste (3M ESPE).

Once each margin was clearly visible, the full-arch Omnicam scan of the maxilla was made with an OpraGate (Ivoclar), and the Isolite System in place to improve the ease of the digital recording process (Fig. 5). At this time, Sirona's 4.0-level inLab software was used to "stitch" the digital scan of the chairside provisionals with that of the prepared teeth to virtually confirm adequate occlusal reductions had been made (Fig. 6). Once the optical impressioning was completed, all remaining

retraction cords were removed, and a full-arch PVS impression (Kerr) was made of the maxilla to fabricate a working model for the laboratory technician and to allow for marginal cross-verification of the milled restorations.

The full-arch maxillary Omnicam scan, along with the Biocopy scan of the chairside provisional, were then used to design milled CADpro Temps. These proprietary temporary restorations provided by Jurim Dental Studio are ideal for long-term provisionalization. They are made using an industrially produced PMMA of incredible strength and esthetic, and can be milled – in this case with Sirona’s inLab MC XL milling unit. With the margins marked on each tooth preparation by the operator, Jurim Dental Studio’s CAD/CAM team was able to use the Biocopy scan to aid in the design of the CADpro Temps to ensure they best mimicked the desired esthetics and occlusion worked out in the patient’s chairside provisionals. The superior-fitting individual CADpro Temps were then milled and finished by Jurim Dental Studio, and inserted using TeliocS cement (Ivoclar) (Fig. 7).

While fabrication of CADpro Temps may seem like an added treatment step, it has some tremendous benefits. First off, the delivery of each individual CADpro Temps unit allows for verification that the margin marking on each tooth in the Omnicam scan is accurate (Fig. 8). If any inadequacies are identified, the corrections to the margin marking can be made prior to milling of the final restorations. The occlusion and esthetics of the digital design of each restoration can also be evaluated, and any necessary adjustments can be made prior to the final milling. Lastly, delivery of the well-fitting, milled provisional CADpro Temps allowed for the gingival health to improve tremendously prior to delivery of the final restorations, ensuring ideal conditions for insertion of the final case



Fig. 7: CADpro Temps smile

Fig. 8: Margin marking evaluation with CADpro Temps

Fig. 9: Improved tissue health following provisionalization with CADpro Temps

Fig. 10: Maxillary final IPS e.max CAD restorations cutback and fired

Fig. 11: Maxillary final IPS e.max CAD restorations with anterior characterization

(Fig. 9), not to mention certainly less stress during the delivery appointment.

The patient wore her milled provisionals for several weeks, verifying their accuracy of the duplicated occlusion. After confirmation that she was functioning with complete comfort and that she achieved emotional closure with the esthetics of her CADpro Temps smile, the remaining treatment of milling and delivering the final units was both predictable and easy. The maxilla was restored first. The design of the CADpro Temps in Sirona’s 4.0-level inLab software allowed for the change of material to IPS e.maxCAD (Ivoclar). Prior to milling, any minor marginal changes

were made to the case, and the final design was updated. Virtual cutbacks of the anterior facial esthetic zone were added to allow the skilled laboratory technician to artistically overlay IPS e.max Ceramic veneering porcelain (Ivoclar) to customize the cosmetics of her smile (Figs. 10-11).

Try-in of the final units with a disclosing medium (GC Fitchchecker) revealed excellent marginal fit and seal, and the patient was very pleased with the esthetics. With the patient’s consent, the maxillary units were cleaned for 20 seconds using Ivoclean (Ivoclar), then silanated with Monobond (Ivoclar) and delivered using Multilink (Ivoclar) as per the manufacturer’s instruction. All excess cement was meticulously removed, and any necessary occlusal adjustments to ensure an anterior guidance scheme

Fig. 12: Mandibular CEREC Omnicam full-arch digital impression

Fig. 13: Intraoral try-in of mandibular posterior chairside IPS e.max CAD units

Fig. 14: Final restorations delivered

Fig. 15: Post-operative photographic series



were made to the opposing provisionalized mandible.

With the maxilla restored against the provisionalized mandible at the desired new vertical dimension of occlusion, restoration of the mandible was completed in three segments to ensure controlled maintenance of this position. The posterior mandibular teeth did not pose a big cosmetic challenge and, therefore, these separate areas were completed chairside using the Omnicam (Sirona) over two appointments. The teeth were scanned (Fig. 12), and the units were designed based off the Biocopy scan of the provisionals in the 4.0-level inLab software. The occlusion of the proposed restorations was set to the restored maxilla, and the units were milled using IPS e.max CAD blocks and the in-office MC XL machine.

The restorations were then tried-in intraorally in the blue state to verify their marginal fit (Fig. 13), and finished using IPS e.max Glaze (Ivoclar) and a 14-minute firing cycle in the Programat CS oven (Ivoclar). These units were prepared for insertion by etching for 20 seconds with Etchgel (Ivoclar) and silanated with Monobond (Ivoclar) and then delivered in the same manner as the maxillary units using Multilink (Ivoclar). Once the two posterior mandibular segments were restored, the six remaining mandibular anterior teeth were scanned, designed and milled from IPS e.max CAD blocks



which were cutback and completed by a laboratory technician to achieve the desired esthetics. The same protocol as previously described was used for delivery of these final remaining six units.

Final occlusal adjustments were completed a week later. Post-operative pictures were then taken two months after the case was inserted (Fig. 14-15). These pictures highlight the enhanced cosmetics of the patient's new smile, with improved gingival harmony and health, correction of tooth angulations and uniformity in shade and restorative material. The digital CEREC workflow

afforded a degree of predictable and reproducible control that ensured the final cosmetic result was long-lasting and exactly what the patient desired.

The author would like to thank Adrian Jurim, C.D.T., M.D.T., at Jurim Dental Studio for inspiration and the exquisite technical fabrication and esthetics of the IPS e.max restorations featured in this case.

For questions and more information, Dr. Jurim can be reached at Alan@jurimdental.com.