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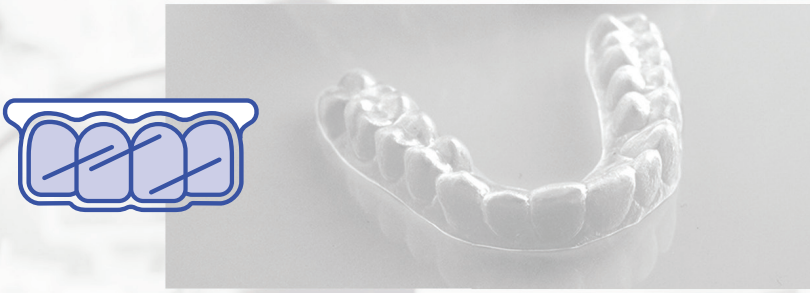

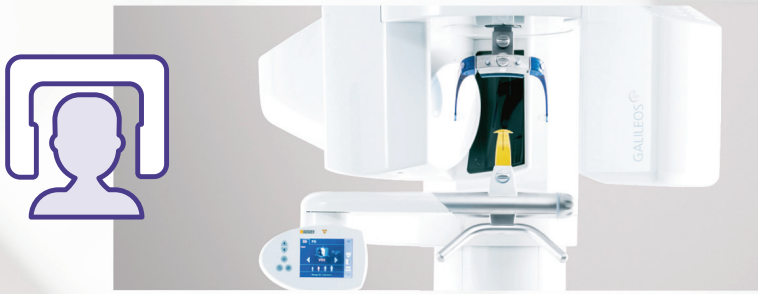

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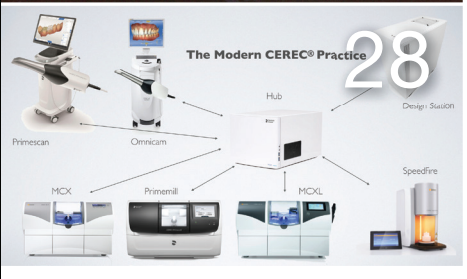

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WELL…

Meet the new boss, same as the old boss
"Won't Get Fooled Again" (The Who)

We'll get to that quote in a second. I'm writing this as spring has sprung from home because that's where we are in the world now. This particular "letter" has been quite difficult to write. There have been times I wanted to stop at the title and let it stand by itself. As I write this, I have NO idea how long the coronavirus pandemic will last. Well, here goes.

Just about two weeks ago at this writing, some Mentors and I were sitting in the Manji Boardroom getting ready for our Assistants' Course. One of them said, "I never have seen anything like this before." I turned to the Mentor and replied, "If you live long enough, this probably won't be the last time you say that."

We have all been through trying times. In my lifetime so far, I have practiced diving under my desk preparing for a nuclear bomb to watching a plane crash into the World Trade Center. I started a practice at the time my wife was eight months pregnant with a buy-down mortgage rate on our house at 16.9% and a prime rate at 21%. I've been through dot-com busts and been laid on a hospital bed for a cancer surgery that the surgeon said was going to be really bad! And this was in year two of the last financial meltdown and after building and equipping a new office!

Yeah, things can be bad. And I'm here to tell you it's possible to recover and rebound. Pete Townshend has also written "Don't know where I'm going, don't know what I need. I'm going to get where I'm going to end up and that's alright with me." Well, that's not the case for CDOCS.com and I suggest that should not be the case for YOU!

Humbly speaking, CDOCS has been the Boss in CEREC® education in the past and now with our partner, Dentsply Sirona, is and will be the Boss for education in several areas of dentistry — orthodontics, endodontics, CAD/CAM, implants, and cone beam. It's a bargain to invest in yourself and your practice. It is the time now, and always, to get in tune with the possibilities of rebounding and recovering and continually making you and your practice better!

I'm sure you have heard the phrase "this too shall pass." However, did you know it's not biblical, unless one considers Abe Lincoln biblical! During a rather turbulent time in which he was living, in a speech more than 160 years ago, he said, "How chastening in the hour of pride — how consoling in the depths of affliction: 'And this, too, shall pass away.'" He ended the speech with this, "And yet let us hope it is not quite true. Let us hope, rather, that by the best cultivation of the physical world, beneath and around us; and the intellectual and moral world within us, we shall secure an individual, social, and political prosperity and happiness, whose course shall be onward and upward, and which, while the earth endures, shall not pass away."

As always, we are your partner in going onward and upward. Take care and be well!

For questions and additional information, Dr. Fleming can be reached at mfleming@cdocs.com.

Mark Fleming, D.D.S.
Editor

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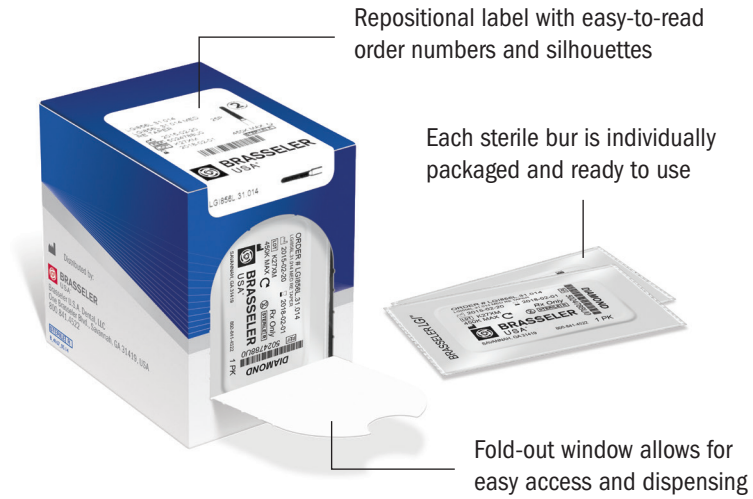

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CDOCS Clinical Accelerators Explained

By Sameer Puri, D.D.S.

With the arrival of 2020 came many events, some expected and some unexpected. The unexpected was the coronavirus pandemic, which is still reverberating throughout the dental community. However, the expected event was one that CDOCS has been working on feverishly with the help of Dentsply Sirona for some time — Clinical Accelerators. This article will describe the Clinical Accelerator program in detail and how these Accelerators can benefit practices looking to enhance their procedural offerings for optimal patient care.

In 2012, cerecdoctors.com, now CDOCS, created a program with its partners called CEREC® ACCEPT. ACCEPT was a two-day CEREC educational program designed for non-owners to have a first-hand CEREC system experience. Doctors would go through a series of lectures and hands-on exercises that would help them become more familiar with the system's capabilities. The program was designed to help doctors make the decision of whether the CEREC system was appropriate for their practice. Doctors would work on cases that they brought

Doctors who followed the educational journey prescribed for them with their CEREC purchase were virtually destined to succeed with the technology.

from home to see how the system worked on their own preparations, their own cases. Those doctors who chose to start their journey with CEREC received the CEREC system CDOCS Level 2 workshop with their purchase. The Level 2 workshop was designed to help doctors receive training on the CEREC system. The result for those doctors was a massive improvement in integration and uptake of the CEREC technology. Doctors who followed the educational journey prescribed for them with their CEREC purchase were virtually destined to succeed with the technology.

Following the success of the prescribed education with the CEREC system, in fall 2019, Dentsply Sirona also included the CDOCS training program for cone beam users. Doctors who purchased a Dentsply Sirona cone beam system were given a training workshop for hands-on learning of the nuances of the software and hardware.

Due to the success of these endeavors, the discussions continued on how we could offer more training for other educational disciplines. This led to the creation of the Clinical Accelerator program. If training could be done successfully for CEREC and cone beam, then why not other products? Starting with the 2020 Chicago Midwinter meeting, any large capital equipment sold by Dentsply Sirona would include a Clinical Accelerator kit. Capital equipment included items such as qualifying cone beam systems, CEREC Primescan scanning devices, CEREC Primemill milling units, and full CEREC systems. Each piece of equipment included with the purchase of a Clinical Accelerator has a value of $10,000.

There are four different kits that can be included with the purchase of equipment. An Endo Accelerator, Ortho Accelerator, Implant Accelerator, and Restorative Accelerator. Each Accelerator contains $2,500 of product credit from Dentsply Sirona, a membership to cdocs.com,

and two clinical workshops in the disciplines of ortho, endo, implants, and CEREC offered by CDOCS.

One of the main reasons that cerecdoctors.com was renamed CDOCS.com was due to this expanded educational curriculum that was to be offered with the Clinical Accelerators. The workshops are led by leaders in their respective fields and include periodontists, oral surgeons, endodontists, orthodontists, as well as general practitioners.

Accelerators may be purchased on their own or are included with the sale of capital equipment as discussed above. Individual purchases of the Accelerators are $7,500, a savings of $2,500 for the doctor.

The different workshops included with the purchase of equipment are designed to make the clinician proficient in each educational discipline through a series of lectures and hands-on exercises. The implant workshops are designed to get new users comfortable with placing dental implants and include a series of six workshops that will give a novice practitioner with implants the experience of using a combination of placing implants in models as well as pig jaws to simulate actual placement in the human jaw. The initial two workshops are included in the Clinical Accelerators.

The endodontics workshops get practitioners comfortable with simple and more difficult endodontic cases including incisors, premolars, and molars. Rotary file techniques, as well as different obturation techniques will be discussed with plenty of hands-on experience on extracted teeth. Practitioners will be required to bring extracted teeth as part of the workshop for the most practical experience possible.

The orthodontics workshops will focus on clear aligner technology using the SureSmile system. Users will understand the indications and contraindications

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of aligner therapy and gain experience in which cases are appropriate for general practitioners to treat and which are best treated with traditional orthodontics or are ideal referral candidates to a specialist.

Finally, the CEREC workshops are the same workshops that we at CDOCS have spent the last 15 years refining. They include workshops on single teeth and quadrants, as well as anterior and posterior teeth. In addition, there is an entire workshop dedicated to restoring dental implants chairside with the CEREC system.

These workshops are the result of years of educational experience as that is what we do at CDOCS. I'm proud to be part of the team that has helped thousands of doctors become more efficient in their practices and offer more services to improve their practice offerings.

Also included with the Clinical Accelerators is a membership to CDOCS.com. Since 2006, the website has been dedicated to providing the most up-to-date content on the CEREC system. With the expansion of the curriculum, we have been feverishly adding lots of content on clear aligner therapy, endodontics, as well as implant treatment — both placement and restorative. The website is designed to offer doctors videos they can review after a workshop to refresh them with the key concepts of the workshop or use the videos as primary educational resources to learn new techniques.

Our commitment to doctors is and has been to continue to provide the best possible educational experience for them whether they are on our campus or online with relevant content that doctors can use Monday morning. I, along with my team members, have dedicated our careers to helping doctors become better clinicians to provide better care for their patients.

The Clinical Accelerator program is simply an extension of the work we have been doing over the years to ensure that doctors have a broad-based educational resource in key dental disciplines. I hope you will join us for one of the upcoming workshops offered by CDOCS and enhance your clinical offerings to your patients. Now more than ever during this economic recovery, it's imperative to expand your procedural knowledge and provide the best possible care you can for your patients.

For questions and additional information, Dr. Puri can be reached at spuri@cdocs.com.

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Treatment of Traumatically Fractured Incisors

Mike Skramstad, D.D.S.

Treating traumatic fractures of single anterior teeth is something that all dentists do routinely in their dental office. However, what does the research tell us with regard to the optimal methods of handling these clinical scenarios? How can we as CEREC® dentists treat these fractures more effectively for better longevity? Andreasen et al. conducted numerous studies in the early 1990s that continue to be referenced to this day on this topic. In 1991, the article "Reinforcement of bonded crown fractured incisors with porcelain veneers" was published.[1] This study described a method of using porcelain veneers to reinforce crown-fractured incisors that have been restored by reattachment of enamel-dentin fragments. It was found that the fracture strength of this method was equal to that of intact incisors.

In 1992, Andreasen et al. expanded upon this study in the article "Treatment of crown fractured incisors with laminate veneer restoration. An Experimental study."[2] In this study, they restored a fractured incisor with: 1) a laminate veneer after initial treatment of reattachment of original crown fragment, 2) a composite buildup after reattachment of original crown fragment, and 3) a veneer alone with no treatment of fracture. It was found that all methods resulted in a fracture strength equal to intact incisors could be achieved.

Further research has been done since then expanding on the work of Dr. Andreasen by many researchers. One notable example is Dr. Pascal Magne in his book, *Bonded Porcelain Restorations in the Anterior Dentition: A Biomimetic Approach.*[3] Dr. Magne describes in his book a unique approach to restoring natural biomechanics of teeth with an additive approach. The idea that using a conservative method of restoring traumatically fractured incisors is often beneficial compared to the traditional usage of "crowns."

In this article, two traumatic cases will be discussed using the aforementioned methods. Both cases have proved to have longevity of more than 10 years and further support the research on how best to achieve predictable results with fractured anterior teeth.

CASE STUDY 1: Traumatically Fractured Lateral Incisor

In 2010, a 10-year-old female presented to the office with over half of her lateral incisor (tooth #7) fractured. The trauma was caused by a pillow being thrown at her with a remote control inside the pillow case. There was a small pin-point exposure of the pulp (nonbleeding) and no pain (Fig. 1). The tooth pulp at this time tested normal and she had the tooth fragment with her undamaged.

The decision was made to bond her tooth fragment to the fractured lateral using a filled total etch adhesive (OptiBond FL) and layer composite over the top to blend and reinforce. Both the tooth fragment and intraoral

Fig. 1: Preoperative condition

Fig. 2: Tooth fragment bonded

Fig. 3: Final result

Fig. 4: Preoperative condition

fracture were treated appropriately and bonded together (Fig. 2). Although the fragments approximated excellently, the dehydration of the broken tooth fragment created a slight esthetic issue. To alleviate this issue and to reinforce the bonded tooth fragment (per Magne and Andreasen aforementioned), composite resin was layered on the facial surface (Kerr OptiBond FL and Ivoclar Vivadent Tetric EvoCeram). The final result restored both her function and esthetics (Fig. 3).

Although the trauma resulted in a pin-point exposure of her pulp chamber, the decision was made not to initiate root canal treatment. The patient was advised that this was a possibility and we would have her back into the office in one month for pulp testing of the tooth (unless symptoms arose). After one month, her pulp still tested normal. This was repeated at her six-month recall visit for a period of three years; all resulting in normal pulpal response.

The patient is now 21 years old and the restoration is still intact with normal pulpal response. By reattaching her fractured tooth fragment and supporting it with an additive composite restoration, the tooth was restored to its natural strength. Furthermore, it was extremely conservative and in the best interest of the patient.

CASE STUDY 2: Traumatic Fracture of Central Incisor

In 2009, an 11-year-old male presented with an extensive fracture of his central incisor (tooth #8). "I was sledding with my brother and hit my face on the sled going down the hill." He stated that he had minimal discomfort (Fig. 4). The fracture was half of his clinical crown and included a portion of the mesial-lingual area of the tooth with a pin-point exposure of the pulp chamber (Fig. 5).

Fig. 5: Pin-point exposure

This patient also had his tooth fragment with him and it was undamaged. Because he was not in clinical pain, the decision was made not to commence root canal treatment, although the patient and his parents were advised that this was a likely scenario due to the extent of the fracture to the lingual.

The lingual fracture was removed with anesthetic and the tooth fragment was bonded to the fractured tooth using a filled dental adhesive (OptiBond FL). The bonded tooth fragment was supported with an additive composite restoration on the facial and lingual portions of the tooth (Kerr OptiBond FL and Ivoclar Vivadent Tetric EvoCeram) (Fig. 6).

Due to the extent of the fracture, it was decided to further support the reattachment of the tooth fragment with a minimal thickness veneer. It is important to note two things when doing this procedure: 1) the veneer

Fig. 6: Bonded tooth fragment

Fig. 7: Veneer preparation

Fig. 8: Bonded veneer

must be minimal and completely in enamel to correctly restore the strength of the fracture to the strength of the original tooth, and 2) since the patient is so young, it must be communicated to him and to his parents that he is still growing. It will be necessary to restore this tooth again when they are an adult due to eruption.

A 0.3-mm veneer preparation in enamel was completed on the patient at the original visit (note position of the cervical margin and the fracture line) (Fig. 7). Using the CEREC Bluecam, an image was taken of the preparation and a veneer was designed

Fig. 9: Tooth at 10 years postoperative

and manufactured with VITABLOCS Mark II. The veneer was bonded with light cure-only veneer cement (3M RelyX Veneer), adjusted, and polished (Fig. 8). Although the value was a little low, both the patient and parents were pleased and happy to have a restored tooth on the same day.

Because of the pulp exposure, we recommended that the tooth be pulp tested at monthly periods after initial treatment. This was done both one and two months after treatment with normal tests. After six months, the patient presented with pain on the restored tooth. It was determined that the tooth had necrosed and root canal therapy (RCT) was necessary. The RCT was completed in August 2009 and pain was alleviated.

During the next 10 years, the patient presented periodically for routine dental maintenance and the tooth was intact and performing well. However, due to normal growth and eruption, the esthetics of the restoration (both color and position) needed to be addressed (Fig. 9). The patient was now 21 years old and ready for a final restoration. Because of the lingual fracture, it was decided that a full coverage crown would be the treatment of choice. In retrospect, after reading more literature on the topic, margin elevation using a composite restoration on the lingual and another veneer could have been completed.

Using CEREC 5 software, it was decided to restore the patient with a full coverage crown using the "Copy and Mirror" Design Mode and use again VITABLOCS Mark II (Fig. 10). The tooth was prepared for a full coverage crown (note the position of the previous fracture on the facial). Waiting for full growth and

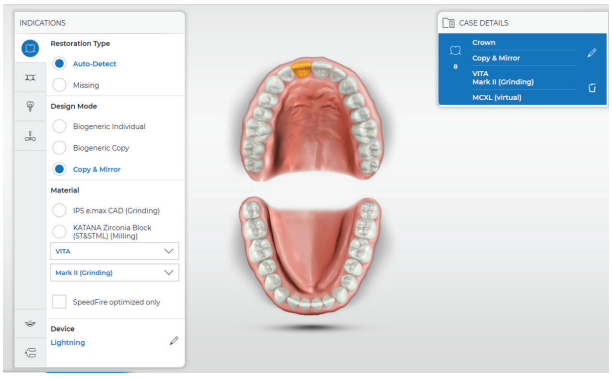

Fig. 10: Copy and Mirror Administration

Fig. 11: Tooth preparation

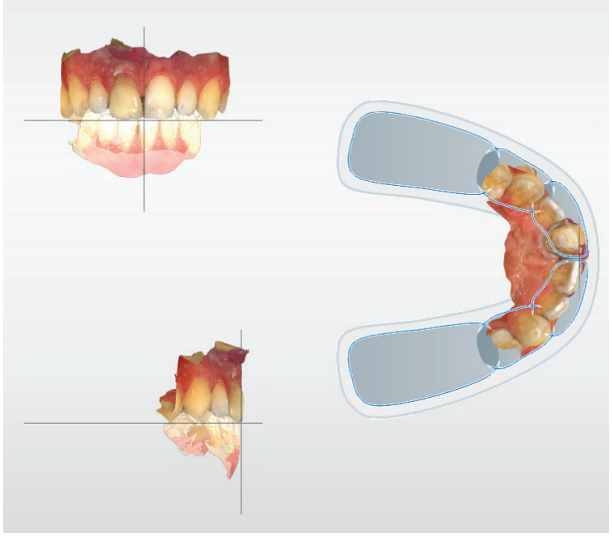

Fig. 12: Model Axis verification

eruption in this case also served as an advantage by moving the fracture more incisal giving us healthier tooth structure to work with (Fig. 11).

Even though the Model Axis is automatically

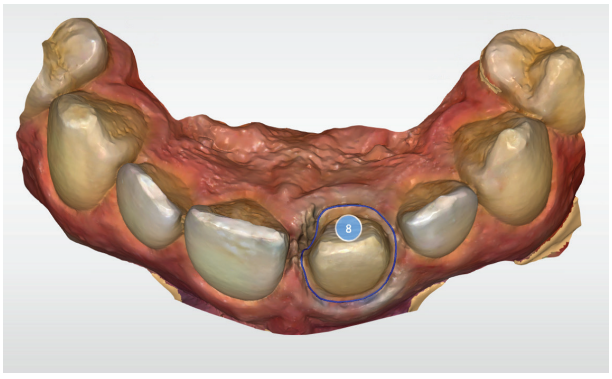

Fig. 13: Margination incisal view

determined with the CEREC 5 software, it is recommended (especially when using Copy and Mirror) to verify that the occlusal plane is correct. The easiest way to ensure this is by the upper left portion of the Model Axis (Curve of Wilson). The midline of the central incisors should be perpendicular to the incisal edge. This method is made easier by taking a Biocopy image of the previous restoration as that will appear in the upper left area, even though the tooth is prepared in the "horseshoe" (Fig. 12).

The software automarginated the preparation and minor edits were manually made (Figs. 13 and 14). The next step in the process is the Copy Line for the Copy and Mirror technique. It is recommended to generally take the initial proposal of the Copy Line unless the entire tooth is not copied. It does not matter much if there is tissue included in the Copy Line (Fig. 15).

After initial proposal, the CEREC tools were used to design the restoration to completion (Fig. 16). Note that there is a space located in the software design at the cervical midline that often can be thought to result in a clinical black triangle. However, we must realize that tissue (and in this case midline papilla) is often retracted using cord. The original preoperative position of the midline papilla can be determined by overlaying the Biocopy image (Fig. 17). By doing this, you can see that the space should in fact be filled by the papilla once healing is complete. Biologic principals of tissue are quite predictable and if the tissue was once there, it should go back again. Also, we can evaluate the position of the new restoration compared to the previous one. It was necessary in this case to "shorten" the restoration because of the eruption previously discussed.

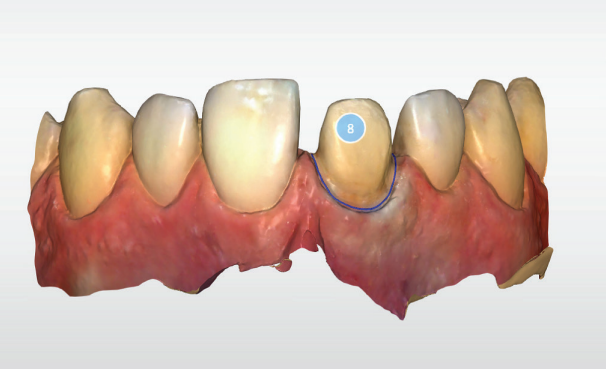

Fig. 14: Margination facial view

Fig. 15: Copy Line

Fig. 16: Restoration design

Fig. 17: Overlaying Biocopy image

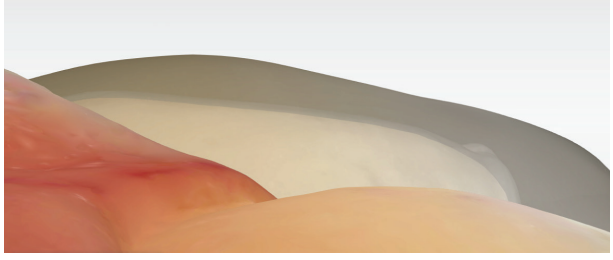

Fig. 18: Evaluating thickness

Fig. 19: Final restoration

When doing an anterior restoration (crown or veneer), it is recommended to have at least 0.5 mm (500 microns) restoration thickness if incisal reduction is performed. We can further evaluate this thickness by using the Cut tool in the CEREC software (Fig. 18). Care must be taken to evaluate areas of "overmilling" to make sure that this will not result in any cement or preparation show though on the final restoration.

The final restoration was manufactured, stained, and glazed and bonded into place (Fig. 19). The patient was quite pleased with the shape, color, and esthetics of the final restoration. A final radiograph was also taken to make sure no resin was left subgingival that might result in tissue inflammation (Fig. 20).

In this article, two trauma cases were discussed and treated/evaluated over a span of 10 years. Other cases not included in this article have been treated successfully in a similar fashion. Both the literature and anecdotal clinical evidence in my clinic support the method of reattaching tooth fragments and supporting them additively either with composite resin or laminate veneers. This will both restore the incisor to a fracture

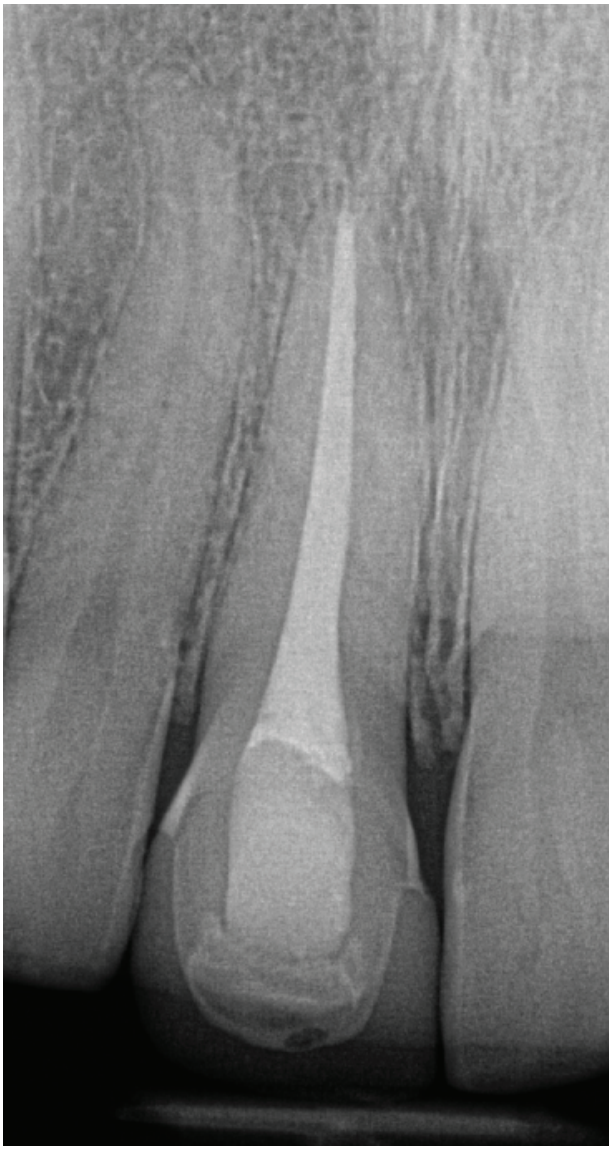

Fig. 20: Final radiograph

The idea that using a conservative method of restoring traumatically fractured incisors is often beneficial compared to the traditional usage of "crowns."

strength equivalent to the natural tooth and preserve natural biomechanics. Although this may not work or be realistic in all clinical scenarios, it is a method that should be considered when available.

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Smiles for a Cause

Kristine Aadland, D.M.D.

Abstract

Today's digital technologies and new advanced restorative systems have elevated computer-aided design (CAD)/computer-aided manufacturing (CAM) chairside procedures from single-day crowns to single-day smile makeovers. Workflows have become more streamlined and efficient, and restorative outcomes are more predictable and esthetic. As a CEREC® dentist, I'm committed to using technologies and restorative products that save chairtime, expand restorative procedures, and offer increased efficiencies in my practice without sacrificing the quality, esthetics, and long-term durability of the restorative outcome. This is of particular importance because today's patients are looking for quicker and more efficient dental visits.

Introduction

Time and efficiency, especially when working on a single-visit multiunit case, is of critical importance to me. I am often frustrated in these types of cases when I begin removing decay from a tooth and realize the amount of remaining tooth structure will not be adequate to ensure a strong bond with the replacement crown. This means prepping must be stopped to build up the tooth and then refine the prep. Tooth-colored, light-cured direct composite filling materials offer the most esthetic option for patients but often require tedious, time-consuming, and technique-sensitive protocols.[1] Proper photopolymerization of incrementally placed composite layers is the most common source of error in direct restorative procedures and of critical importance in preventing postoperative sensitivity and marginal leakage.[2]

Recently, I began using the 3s PowerCure System (Ivoclar Vivadent) and have come to realize the benefits in efficiency and light-curing technology this direct composite delivery system of coordinated materials has made to my practice and to my patients. The system is comprised of the Bluephase PowerCure curing light, Adhese Universal bonding agent, and Tetric PowerFlow and Tetric PowerFill restorative materials, all of which have been designed to work together to streamline the restorative workflow for any direct or indirect restorative procedure done by dentists. Tetric PowerFlow and Tetric PowerFill have been formulated to be placed in 4-mm increments and cured in as few as 3 seconds using the 3s PowerCure high-intensity LED curing light.[3] Both materials contain Ivocerin, a photoinitiator that allows for an increased depth of cure of bulk materials while still maintaining an enamel-like translucency. Adhese Universal bonding agent allows any one of three workflows: self-etch, total etch, or selective etch, for strong initial bond strengths while reducing the chances of postoperative sensitivity.

The LED curing power of the 3s PowerCure curing light with its 3,000 mW/cm^2 of light curing power increases light penetration and decreases curing times to minimize the risk of human error during curing. The curing light also incorporates Polyvision technology to automatically detect movement away from the occlusal surface during curing to alert the dentist to the potential of an inadequate cure and then automatically extends the curing time. This feature is especially useful when working in tight posterior areas where visibility and reachability are difficult or perhaps when my assistant gets distracted and drifts away from the tooth we are working on.

When it comes to restoring multiunit cases, especially when both esthetics and strength are needed, I decided to take advantage of the new esthetic zirconia options available on the market. As a long-time user of IPS e.max (Ivoclar Vivadent) I was looking forward to utilizing the IPS e.max ZirCAD MT Multi blocks. I have always loved the strength and beauty that IPS e.max CAD provides and had no doubt that the Multi zirconium block would deliver the same result. This particular block is a combination of a translucent zirconium oxide class 5Y-TZP at the incisal region and a more opaque 4Y-TZP oxide class at the dentin region. The flexural strength is 850 MPa with a fracture toughness of 3.6. Very impressive results!

Working with a coordinated system of materials and technologies that allow me to tackle complex cases in an efficient, time-saving treatment process while ensuring an esthetic, durable outcome in a single appointment has boosted patient treatment plan acceptance and benefitted my bottom line.

Clinical Case

Renee presented to the practice to replace missing tooth #28, which had been extracted months before and caused her embarrassment when she smiled. An earlier attempt to repair tooth #28 with endodontic therapy had resulted in failure and loss of the tooth, as well as an experience that left her traumatized. Previous treatment had included a deep cleaning to remove significant buildup, but she presented with visible calculus on her teeth. In addition, prior dental treatments had required traditional impressions, which were painful due to the presence of mandibular tori (Fig. 1). When she arrived at my practice, her trust in dental procedures was very low and her perception of dentistry was associated with pain.

Upon initial exam, teeth #29 and #30 displayed amalgam fillings with underlying caries and her maxillary anterior composite restorations exhibited signs of fracture with open margins (Figs. 2 and 3). Yellow-brownish stains in the cervical region of the maxillary and mandibular incisors, canines, premolars, and molars also contributed to the unesthetic appearance of her smile.

Her personal history was a remarkable journey of a single mother of three daughters, battling addiction, spousal abuse, and homelessness, and her ability to overcome all these obstacles to now give back to others in her current role as the executive director of a homeless shelter is incredible. I wanted to be able to help her regain her confidence, both in dentistry and in herself, and I knew I could do that with my CEREC system.

Fig. 1: Preoperative occlusal image showing large mandibular tori that hindered the use of a traditional impression tray but optimal for digital imaging.

Fig. 2: Preoperative image of the patient's right side showing tooth #28 post-surgery site and recurrent decay.

Fig. 3: Preoperative retracted photo

Treatment

Ideal care for a missing tooth would normally be a dental implant. In Renee's case, the trauma experienced with the extraction of tooth #28 caused her to decline implant therapy. She accepted a treatment plan that included placement of an IPS e.max ZirCAD bridge on teeth #27, #28, and #29 and a single crown on tooth #30. [4,5]

The patient was anesthetized, and I began preparing teeth #27, #29, and #30 for the 3-unit bridge and single crown. Removal of the amalgam restorations on teeth #29 and #30 revealed significant carious lesions. The lesions were fully excavated and treated with Cervitec Plus (Ivoclar Vivadent) antimicrobial varnish to seal the teeth from recurrent decay, but it was clear that both teeth would require a composite build-up to ensure a strong durable bond with the zirconia restorations. After disinfecting the preparations, phosphoric etching gel was applied to create maximum bond strength to the enamel. The preparations

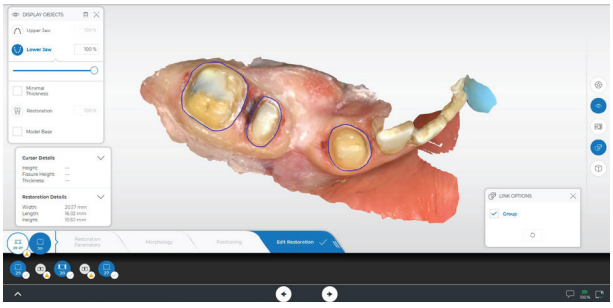

Fig. 4: Screen shot of the scanned preparations and margins for teeth #27–#30.

Fig. 5: Photo of the IPS e.max ZirCAD Multi after sintering.

Fig. 6: Photo of the IPS e.max ZirCAD Multi post stain and glaze.

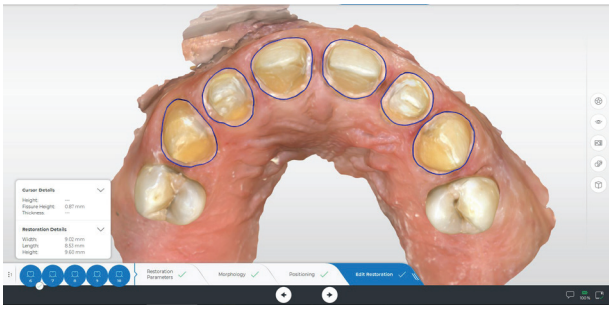

Fig. 7: Intraoral scan of the preps and margins of teeth #6–#11.

Fig. 8: Design of anterior crowns using CEREC® Biogeneric Individual design mode.

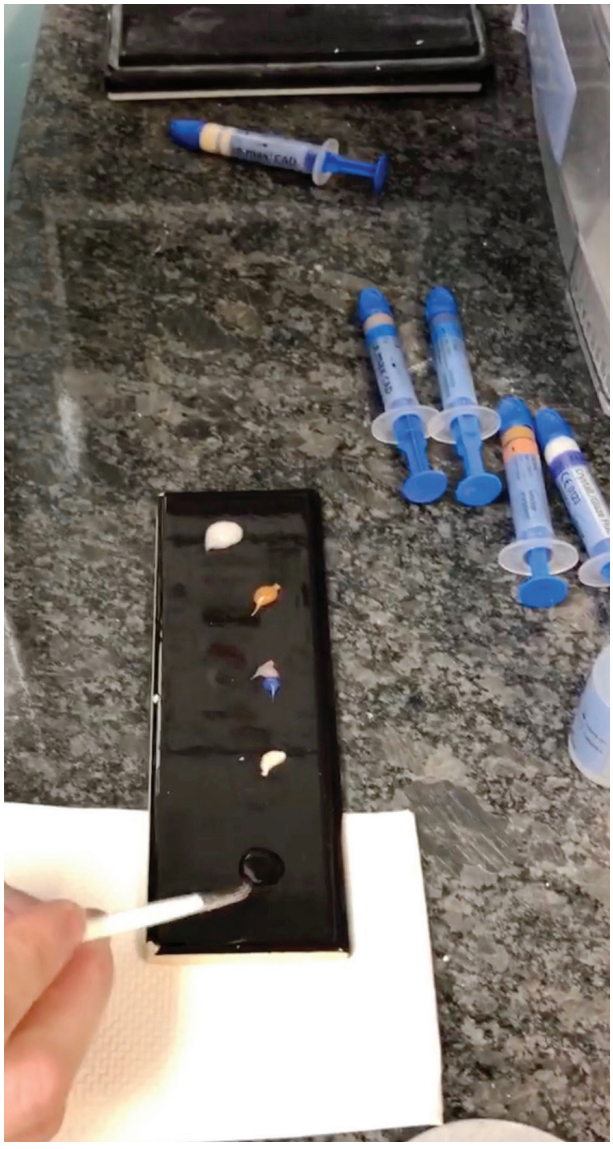

Fig. 9: IPS e.max CAD stains and glaze used for the anterior restorations.

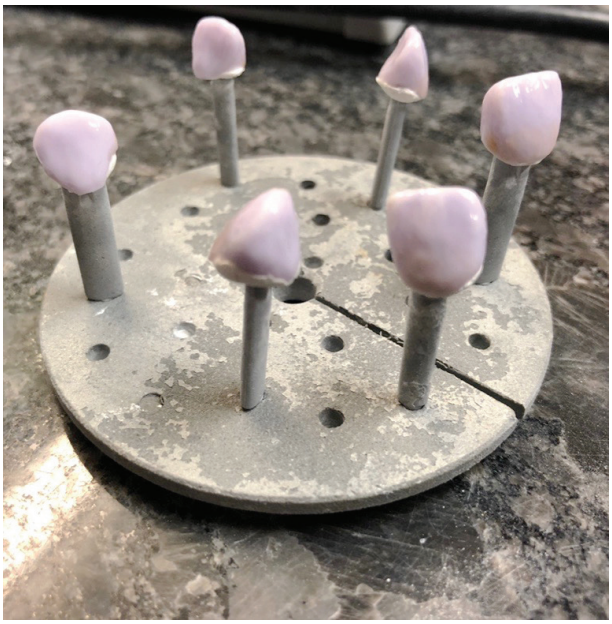

Fig. 10: IPS e.max CAD anterior restorations after contouring, staining, and glazing in the blue phase and ready to be fired in the Programat CS2 furnace.

Fig. 11: Postoperative photo after immediate seating of the IPS e.max ZirCAD bridge on teeth #27–#29 and crown on tooth #30.

Fig. 12: Comparison image of the IPS e.max CAD shade A2 MT crowns on teeth #6-#11 and the IPS e.max ZirCAD Multi shade A2 on teeth #27–#30.

Fig. 13: Postoperative photo immediately after seating of the anterior IPS e.max CAD restorations.

were dried, and Adhese Universal adhesive was placed and cured for 3 seconds. Tetric PowerFill composite was applied in 4-mm layers to build up each tooth, curing each layer for the manufacturer recommended 3 seconds. The PowerCure system's ability to cure the adhesive and each 4-mm increment of composite in 3 seconds made the buildup process much faster.

Once the curing process was complete, I refined the preparations and used the CEREC Primescan intraoral scanner to capture the preparations and opposing arch (Fig. 4). The scans were uploaded to the CEREC CAD software and the crown and 3-unit bridge were quickly designed and sent to the milling units (Figs. 5 and 6). Because the milling and sintering process would take approximately 3 hours to complete and while the patient was still numb, I suggested to her that we restore her anterior teeth with six anterior IPS e.max CAD crowns. She quickly agreed.

I began preparing teeth #6–#11 for IPS e.max CAD crowns. All six anterior teeth exhibited significant caries underlying old composite restorations and required the same build-up procedure as teeth #29 and #30. The preparations were refined, scanned (Fig. 7), and designed in the CEREC software (Fig. 8). While the sintering process for the 3-unit bridge was still underway, the six anterior crowns were sent to the milling units for processing. The milled restorations were contoured and then stained and glazed using IPS e.max CAD Crystall. Stains–1 for gingival warmth (Fig. 9). A mix of stains I1 and I2 was applied for translucency and Crème for the incisal edges and halo effect (Fig. 10). All six restorations were fired on the P1 setting in the Programat CS2 furnace (Ivoclar Vivadent) for approximately 24 minutes.

Fig. 14: Postoperative occlusal view of lower right IPS e.max ZirCAD Multi shade A2 bridge and crown on teeth #27–#30.

Fig. 17: Renee's emotional response to her new smile.

Fig. 15: Full face smile prior to treatment.

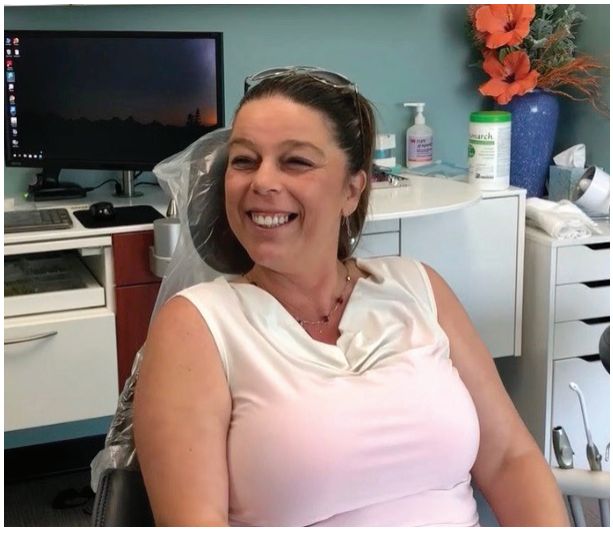

Fig. 18: Renee's new smile.

Fig. 16: Renee seeing her new smile for the first time.

Fig. 19: Full face smile photo at 1 week postoperative tissue check.

After trying-in the restorations (Figs. 11 and 12), the IPS e.max CAD crowns were prepared using Monobond Etch & Prime (Ivoclar Vivadent) by scrubbing the material in for 20 seconds and letting it sit for 40 seconds, followed by a thorough rinse. The IPS e.max ZirCAD restorations were prepared by sandblasting the internal surface and then using Ivoclean cleaning paste for 20 seconds. The six IPS e.max CAD crowns and IPS e.max ZirCAD crown and bridge were delivered using both Adhese Universal and Variolink Esthetic (Ivoclar Vivadent) for both strength and esthetics (Figs. 13 and 14).

I am so pleased with how the IPS e.max ZirCAD MT Multi blended well with the IPS e.max CAD MT. Renee was overjoyed with her new smile (Figs. 15–18). The capabilities we now have for single-visit dentistry and achieving the beauty of high-quality restorations and changing lives in a matter of hours is amazing (Fig. 19).

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The Case for Involving Your Team

Suneet Singh Bath, D.M.D.

Abstract

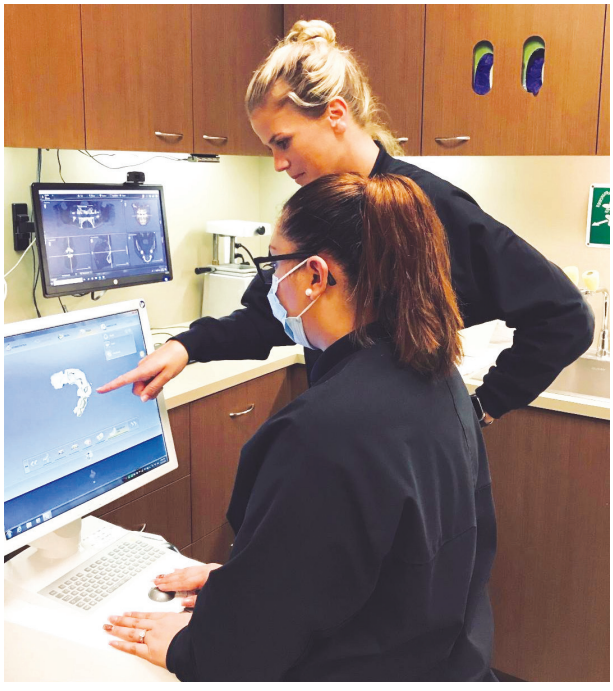
If you are imaging, designing, and milling all of your crowns, it's time to consider getting your team involved. You will be surprised at how much less work you will have, how happy you and your team will be, and how much more you can produce. How does this happen? It starts with changing our mindset. Then, we make sure we have our team's support. And lastly, we get our team trained. Once you do this, your practice will achieve new heights while working the same schedule.

Introduction

Recently, I was in Scottsdale with my assistant for a CDOCS course. We were having dinner with a friend of mine who told me about her practice — it has not grown in years. Sure, we could focus on capacity blockage — too few operatories or too few hours of operation. However, a lot of this just increases our workload and adds overhead. Plus, this was not an issue for her nor is it an issue for a lot of us. So, I presented a simple solution. I told her to train her team to do her CEREC procedures and free up time for her to produce. Like many who are presented with this option, she seemed reluctant, but as we spoke, she understood my points.

Over the past 13 years, I have been more productive by utilizing my team and reducing my amount of stress. We produce more than double the average per hour of a standard one-doctor practice and are known for our quality of care. We reduced our workday to 7 hours (instead of 8) and increased our production. All of this in a saturated market of one dentist for every 400 people.

There are three main components to getting your team more involved. The first one is changing our mindset. Next comes getting our team to believe in us. Finally, we need to get our team trained. This all results in you achieving a practice that is happier and more productive.



Changing Our Approach

A little background: In 2007, I decided to recruit an assistant who was also a CEREC trainer. Luckily for me, she came on board. Her condition was that I buy a CEREC soon and so I did. It was a lot to invest (especially after buying a practice a few months earlier), but it made sense. My sterilization tech was young and eager. It was then that I learned my first lesson — recognize potential in team members and be willing to invest in them. She was willing to learn and my CEREC assistant was willing to teach. I was content prepping and did not care to design. The mindset really started there.

My CEREC assistant had more experience in dentistry than I did and so I then learned my second lesson: It is okay to give up some control to team members who are talented. She definitely was and I knew I could learn from her. It is a different mindset than what we are used to where the doctor is always in charge. We do not have

to do everything. In my practice, I prep and leave. My assistants scan, design, mill, stain, and get the crown ready for cementation. I come in to do the final seat and a bite check. They also do all of my bridges, surgical guide mills, implant placement planning, abutment/crown design, and esthetic multiple anterior cases. Of course, they show me everything for approval and I will do modifications, but I trust their skills and usually have little changes. They do excellent work and our patients constantly compliment them for it.

Now it's time for the third lesson — A happier team is a more productive team. This leads us to our next point.

Getting Our Team to Believe in Us

First off, treat them fairly. It will reward you so much more later. So many of us try to figure out ways to put more money in our pockets. When your team sees how giving you are, they will give back to the practice. And then, you create owners. They will then drive out the non-owners and you will end up with practice ownership bliss.

This is probably preaching to the choir here, but first and foremost, we have to do good work. We need to continuously take CE courses and take our team with us (more on that below). There are great courses and workshops with CDOCS.com (and Spear, for that matter). We have other great speakers and meetings (such as Dentsply Sirona World). There really is no excuse for poor restorations. We all have seen those restorations and it frustrates us because it gives the machine a bad name.

Also, it is important to invest in equipment that allows you to deliver better care. People won't take ownership in a practice of poor facilities or dentistry. Once you get your team proficient with CEREC, think about getting a cone beam. The right team members will be eager to learn the new machines. Every time we have added a piece of equipment, we have seen double-digit percentage growth.

Next, treat your patients fairly. My team knows that we heavily scrutinize our work and if they see something not up to our standards, they have the right to let me know. Though it's rare, we understand no one's perfect and patients appreciate when you tell them you want to make something better. Your team and your patients must trust your abilities and your intentions.

Follow their lead sometimes. Again, they all know that I am in charge, but I value the input of my CEREC assistants. This kind of goes with the first point. Empower them to let

you know if your prep needs to be fixed. This will make your restorations fit better, be stronger, and last longer.

Lastly, be a good teacher. Explain to your team how you do a procedure and why you do it that way. They love to hear your input. Have patience with their questions. Understand their learning style — some are better with your words, but others need to do things to learn. Encourage them when they've done a great job and share their excitement. Let them know it is okay if they make a mistake and tell them you believe in them. This can be difficult for many of us, but the team will respect you more for it and you have more chance of them succeeding. This leads us to our next part.

Getting Your Team Trained

In 2008, I decided to take both my CEREC assistant and my former sterilization tech to the Scottsdale Center for Dentistry (now CDOCS.com) to take a course on mastering posterior CEREC restorations. It was an excellent course and they grasped everything well. I don't remember any other doctors bringing their assistants and I could tell that the Center was not used to this request. Next came the anterior course at the same venue, another anterior course through Ivoclar Vivadent in California, and numerous other courses for them to maintain their CEREC proficiency. Through all of this, I also encouraged them to obtain Expanded Function Dental Auxiliary

licenses that allowed them to place restorations and do other procedures in Washington State. They were both, again, excellent at this. As usual, I encouraged and helped them as much as I could, and they did everything their licenses allowed them to do.

Here's the kicker, neither of them is an employee of mine anymore. Yet our office continues to grow. How? It comes by establishing a culture. We are a practice that will always encourage growth of our team and recruit those who want to grow. Every time a team member takes a course, they are expected to train others on what they learned. This way, if people leave, someone else is able to take over. It is exciting to see team members shine when they are given the opportunity. We are the ones who hold them back sometimes because of our own biases.

So, where should you start? First, you could bring them to a more local course and gauge their interest (Patterson and Schein have them all the time). This is less expensive and will give you some answers with regard to their commitment level. Then, it is time to consider taking them along with you to a CDOCS.com course, especially one of the workshops. They will get the hands-on training they need. After that, you can talk to them about leading your CEREC department. I then outline what I expect them to learn and tie incentives to it. Maybe that means an increase in salary or a bonus after mastering posterior teeth (a certain number of them). Perhaps then, another incentive for mastering anterior teeth, and so on for implants and bridges. They will be required to train others on the process as well.

I know some of you are thinking, "Well, this sounds expensive." And you'd be right, initially. But then, you ultimately save in all the costs of crowns, anterior crowns, implant crowns, and surgical guides. Your overhead actually goes down and things you would consider needing an associate to do can be done by your team (we lost our associate and produced the same the following year with better teamwork). Your team gets patients to commit to further treatment because they are more confident about what they are doing.

Conclusion

It is very important for us to focus our thinking on how to take our team to as many trainings as possible. Our office achieved the level of doing bridges, planning implants, and designing implant crowns after losing the

two assistants I started with. That is because I stuck to my culture and took my next CEREC specialist to more CDOCS.com courses on each of these topics. I even sent her to one of them when I was unable to go. I know this may sound extreme to some, but that is how much I believe in my team. Your assistants are licensed to do a lot of things (check your state) and we need to take advantage of this.

Your team will love that you invest in them and are motivated. They feel important, trusted, utilized, and productive. They enjoy doing different procedures and are proud of what you create together. Your patients don't care that your team does procedures on them. They know they are being well cared for and come (and refer) to me for that reason.

Dentistry is fun because you, as the dentist, don't have to do everything. If you love to do something, by all means, do it. However, by delegating the work, we'll reduce a lot of stress put upon us. Now I am never in a procedure for an extended period of time, and I take frequent breaks. I do the things I enjoy and my team does everything else. This also increases my confidence in myself. I do implant cases I would not have even thought about doing before. It presents a great sense of accomplishment for all of us.

It is my hope this article motivates you to change your approach to team dentistry. Next time you take a course, always think about taking team members. You will all be happier for it. I have achieved the "sweet spot" in my career and I wish the same for you. Here's to happy CERECing. Take care.

For questions and additional information, Dr. Bath can be reached at suneet05@yahoo.com

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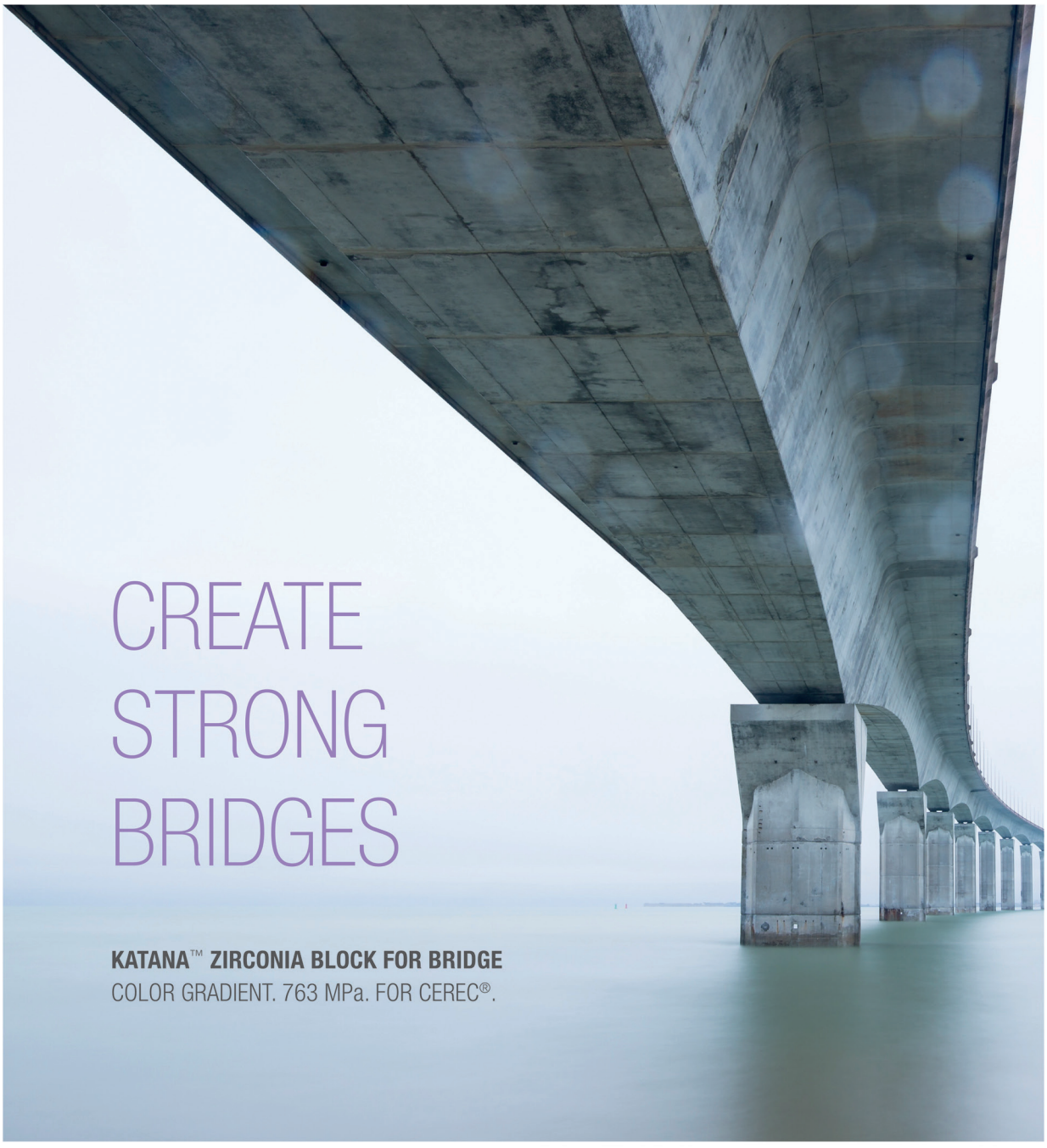

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CBCT in Sleep Dentistry: Part 1 — Clearing the "Air"

Douglas Smail, D.D.S.

Part 1: Clearing up Misconceptions

Whenever I speak on cone beam computed tomography (CBCT) and SICAT Air, I get at least one question from a related set of questions on material they've heard at other sleep dentistry courses. The questions are related to the use of or need for CBCT in sleep appliance treatment. In Part 1 of this two-part series on CBCT in sleep dentistry, I want to demonstrate the rationale for using this imaging by answering these questions.

The first question I typically get is, "Is it true that CBCT can't be used to diagnose sleep apnea because the patient is awake and standing up?" CBCT, or any other tool for evaluation or treatment, was never meant to diagnose sleep apnea. Only a sleep study read by a board-certified sleep physician can do that. The CBCT is a valuable tool for screening patients who already have issues in their medical history or exam findings that indicate a high risk for sleep apnea. It provides a great way to visualize the airway in 3D, which helps you and the patient see the need for further evaluation. If you notice that someone's airway is constricted despite the fact that they're awake and standing (which we see a lot), then you should be even more concerned about how much worse their airway is when they're asleep and horizontal (Figs. 1 and 2).

The second question I get is, "Why did they tell me that a CBCT isn't useful for sleep dentistry?" This couldn't be further from the truth. First, the scan allows you to assess all of the related airway anatomy, as well as document any pre-existing temporomandibular joint (TMJ) pathology. Evaluation of the sinuses, nasal septum, nasal conchae, tonsils, adenoids, lateral pharyngeal walls, soft palate, tongue size/position, hyoid position, any other hypopharynx pathology, and more is essential to ensure other anatomic problems aren't missed (Fig. 3). For example, if the patient's nasal airway is obstructed, an oral appliance won't help the patient. Second, a CBCT can show hidden dental pathology prior to making an appliance.

Estimates indicate that one in three patients show undiagnosed and often asymptomatic dental pathology

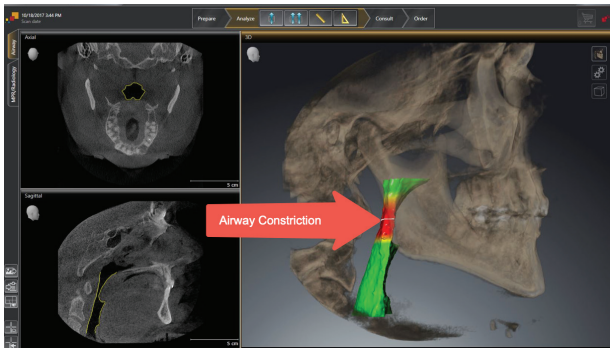

Fig. 1: Constricted airway representation in adult

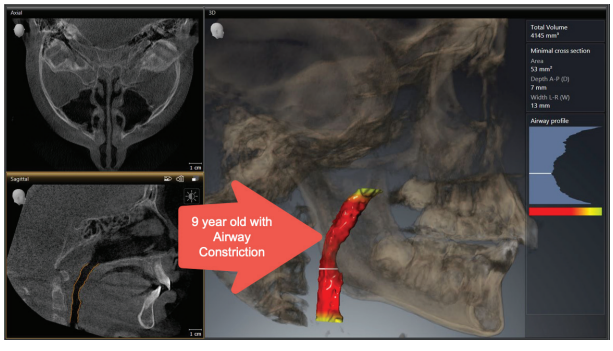

Fig. 2: Constricted airway representation in a 9-year-old child

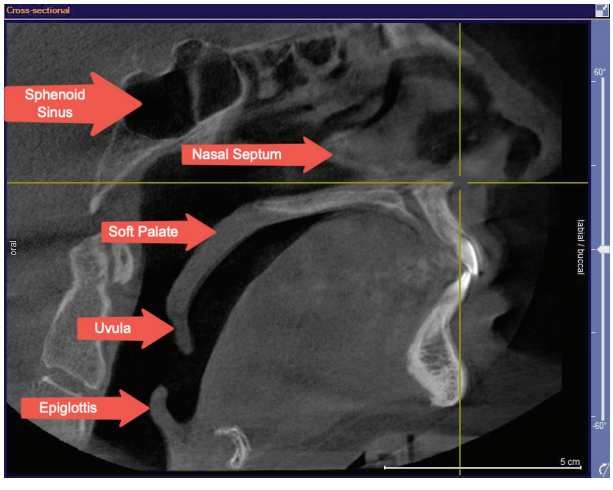

Fig. 3: Airway anatomy

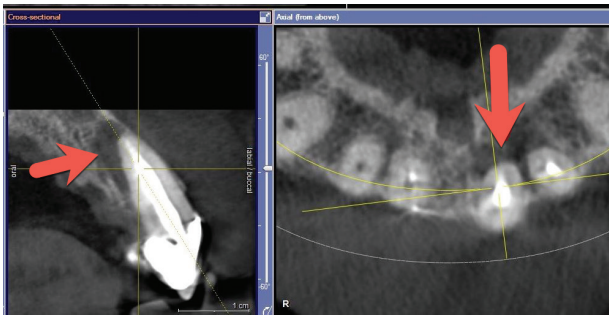

Fig. 4: Periapical pathology

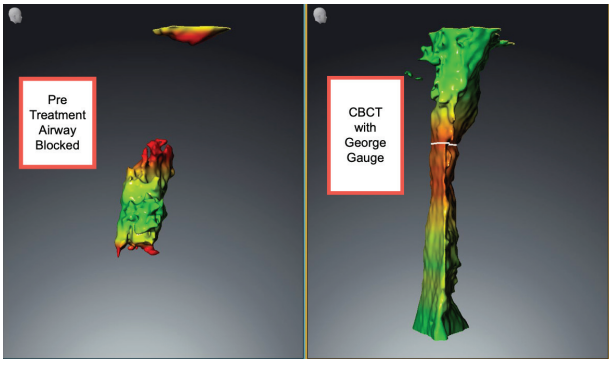

Fig. 5: Opening airway

not seen on 2D imaging. I often see periapical pathology or fractured teeth on these images and always send a note back to the referring general dentist. If you make that appliance and the tooth that you failed to diagnose becomes symptomatic, then you're left providing an explanation and remaking the appliance after the dental issues are addressed (Fig. 4).

The last question I get is, "Is it true when they said you don't need a CBCT to make a sleep appliance?" That's at

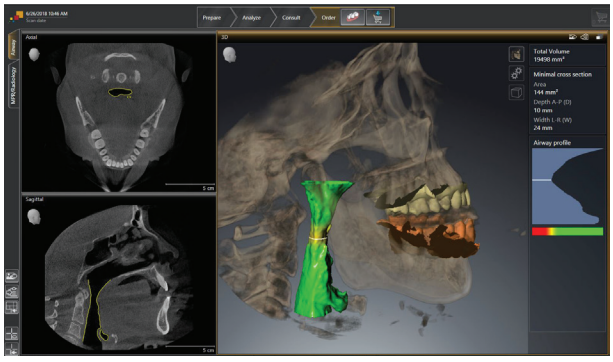

Fig. 6: Condyle–fossa relationship

least half true. It is possible; you can guess the amount of protrusive movement, but we can do much better for our patients. The OPTISLEEP workflow with the CEREC® intraoral scan merged into the CBCT in the treatment position shows not only if the airway is open, but also shows where the condyle–fossa relationship is. I want to know and document that before I send the order for the appliance (Figs. 5 and 6).

As you can see, CBCT imaging plays a pivotal role in the evaluation, treatment planning, and appliance fabrication for the dental sleep patient. I hope this article explained some of the misstatements and misconceptions that we hear in the practice of dental sleep medicine.

In Part 2 of this two-part series, I'll show how the GPS Method of reading CBCT images helps to identify adjunctive pathology in your sleep dental radiologic exam.

For questions and additional information, Dr. Smail can be reached at dsmail@cdocs.com.

The CBCT is a valuable tool for screening patients who already have issues in their medical history or exam findings that indicate a high risk for sleep apnea.

CEREC® Is Now Prime — But Is Your Office Network Ready?

Meena Barsoum, D.M.D.

When I began using CEREC® (Dentsply Sirona) in 2010, technology was in a different place. The iPhone was only a few years old, and smartphones were not quite as dominant as they are now. Social media networks like Instagram were not around yet. The trusty old Bluecam and Compact milling unit were my initial foray into technology. They did not require internet access and communicated through a very simple radio mechanism. The data sent back and forth was quite simple, just a few 1's and 0's to the mill and 35 minutes later, a crown was made. It was certainly a much simpler time that I often find myself longing for!

Today, however, we are in the middle of a massive technology revolution. Screens dominate our world. Our phones tell us how much screen time we are using — a sort of digital shaming! Thankfully, the R&D department in Bensheim, Germany, has not stopped innovating and now we find ourselves in the Prime evolution of CEREC. Last year, we were introduced to CEREC Primescan, which completely changed the way we capture intraoral optical impressions. A few months ago, we launched the CEREC Primemill, which can manufacture high-quality and highly esthetic zirconia restorations in under 5 minutes. We are truly in the golden age of digital dentistry and I can only imagine what new innovations we will see in the near future.

But with all this high-tech wizardry comes important infrastructure requirements. For example,

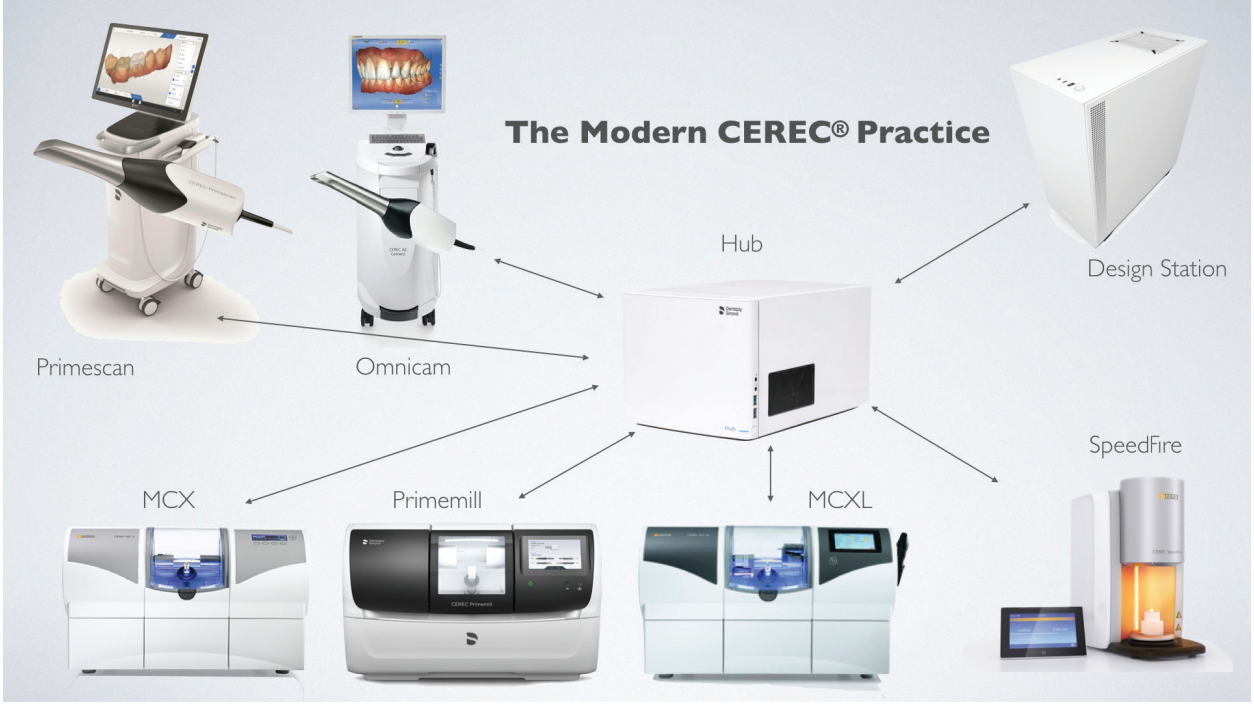

Fig. 1: The modern CEREC® Practice has multiple scanners, multiple milling machines, and multiple networking devices. This is an example of my practice where we use the Hub to control all the case storage and data transfer between each device. I use a remote Design Station to work on and mill my cases, leaving the scanner free to work on other patients.

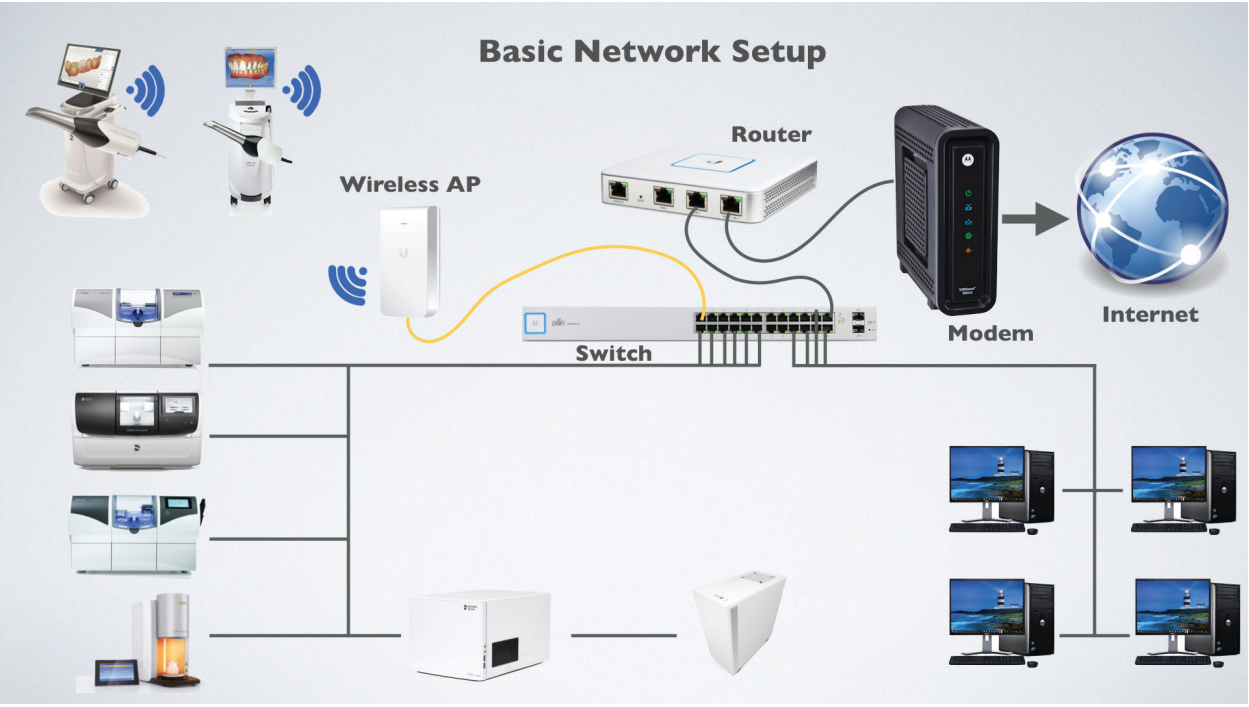

Fig. 2: Basic network setups require modems from your ISP to access the internet. Routers are designed to assign IP addresses to each device on your network. A switch receives all of the ethernet connections from your devices. Wireless Access Points (APs) are used to create WiFi signals that your wireless devices can access (Primescan and Omnicam).

the radio system I mentioned above no longer works with the Primemill. There is simply too much data to pass through it efficiently. It would be like trying to send a photograph through a fax machine. It would be inconceivably slow and inefficient. The good news is, Dentsply Sirona has trained our technicians on how to best install and configure our new Prime systems. In this article, I would like to describe a few best practices to help you prepare your offices for Primetime.

The good news is, if you have a computer-based practice management system, you likely have an adequate network in your office. There are a few components you may need to purchase to improve the bandwidth and range, but it can all be accomplished for a few hundred dollars on the low end, to a few thousand dollars on the extremely high end.

When I first started with my Bluecam, I had only two devices or components to worry about — the AC and the milling machine. Today, I have eight CEREC-specific devices on my network that all need to talk to each other in an efficient manner (Fig. 1). This means my network, my router, and my wireless access points need to be set up correctly to be reliable.

As you can see in the illustration (Fig. 1), the Hub controls all my data and facilitates communication between all the devices. I can scan with my Omnicam and pick up the case on my Design Workstation to finish designing. From there, I send it directly to one of my three mills, followed by sintering in the SpeedFire. The beauty of this integration is that everything works together seamlessly.

However, what you don't see in the illustration is the backbone infrastructure of the office that allows all of this data transmission to occur. Your wired network at your office becomes critical in creating this modern CEREC practice. Think of each of those devices as a "computer." Take your front office, you might have two to three computers plugged into an ethernet port or a network switch. Your operatories might have one computer each, and you might have a computer in your private office. Each of those PCs is plugged into the ethernet port in your wall and it goes back to the main network switch in your office (Fig. 2).

Fig. 3: NETGEAR Orbi mesh routers are very popular and work extremely well with CEREC® equipment.

Here is some basic networking terminology:

- Modem: the device provided by your internet service provider (ISP) that allows you to connect to the internet.
- Router: the device that provides IP addresses to all of the devices on your network. Think of an IP address as a unique phone number for each of your devices.
- Network Switch: the device that accepts all of the ethernet connections from all of your computers. The switch helps interconnect all the devices on your network.
- Wireless Access Point: this device creates a wireless network that mobile devices can access. The access point (AP) connects everything back to your switch and your router.

This is certainly very simplified, but it should give you a general idea of how a basic network is constructed. Once you understand the basic construction, you can scale this up to meet the network demands of your specific office. For example, you may have more than one wireless AP to cover the size of your practice, preventing wireless dead zones. You also may have more than one network switch to help interconnect all the devices and computers.

Fortunately, there are a couple of very good options on the market to help you start building your network. Dentsply Sirona has created a whitelist of wireless APs to create a strong mesh network in your office. You may need to purchase several of these APs to cover your specific square footage. The NETGEAR Orbi WiFi Network (Fig. 3) is a very popular mesh setup and is very affordable at $199 for a three-pack. This is a great starter setup to get a strong wireless network for your Omnicam and Primescan to access. The stronger your WiFi signal is, the better your connection and the more reliable your data transfer will be. This can have a huge impact on sending data to the milling machine without losing the connection.

If you want a more robust, enterprise-level network setup, Ubiquiti Networks (Fig. 4) makes some of the best equipment on the market. These products are what large industries use to create reliable network configurations. These products are moderately priced but can add up as you build your network configuration. If you decide to go this route, I would highly advise consulting an IT professional to help configure the network. It is not designed for the average consumer. However, a properly configured enterprise-grade network can have huge benefits in terms of reliability and performance.

As the modern CEREC office continues to evolve, it is important that we scale our networks to keep up with the increasing data demands of these sophisticated

Fig. 4: Ubiquiti Networks make enterprise quality networking equipment and are used in more sophisticated network setups.

devices. Ultimately, treat each CEREC device as a simple "computer" and plug it in with an ethernet connection. Simple plug-and-play devices like the NETGEAR Orbi series can make this an easy and affordable process. Ubiquiti Networks makes enterprise-grade products for the larger facilities or more sophisticated setups. Whichever route you decide, I encourage you to do your research and engage an information technology professional if you are not well versed in networking.

For questions and additional information, Dr. Barsoum can be reached at mbarsoum@cdocs.com.

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Dentsply Sirona

A Short Implant Solution

Anthony Ramirez, D.D.S., M.A.G.D., D.I.C.O.I.

Being creative in finding a solution to complex dental problems is what we are tasked to do on a daily basis

Not every patient is capable of handling the idea or even interested in full mouth rehabilitation. This case report will document a limited treatment to replace a failed two-unit bridge that had acceptably functioned for this patient for more than 50 years.

The patient is a 78-year-old male in good health who has been a patient of record for nearly 20 years. His dentition has been worn for some time and he has always declined any treatment to improve the prognosis of these teeth. Limited occlusal gingival crown heights would necessitate a full arch rehabilitation to restore form and function. Asymptomatic, he would occasionally present for prophylaxis, but his priorities did not include improving the condition of his worn dentition. The left maxillary permanent canine is impacted and when the premolar crown fractured off its core, he presented to discuss options for replacing these teeth. A fixed bridge spanning the upper left lateral to the second premolar was not a very good option due to extreme wear in #10, nor was the option of a removable prosthesis (strong gag reflex). Endodontic therapy for #12 was considered but not viable as the remaining tooth structure was moderately mobile and the retainer crown with a cantilevered tooth would further compromise this tooth. Having the benefit of cone beam computed tomography (CBCT) imaging allowed me to fully assess the existing maxillofacial anatomy and identify exactly where the impacted canine existed (Figs. 1–2).

A 3D evaluation revealed that less than 7.5 mm of vertical bone height existed from the gingival crest to the impacted canine. This patient was not interested in having the impacted canine removed so I developed a creative implant plan that would include using two distinct implant fixtures from two different manufacturers. I have been successful installing and restoring the Astra Tech EV (Dentsply Sirona) 6-mm implant in the maxilla when I needed to avoid

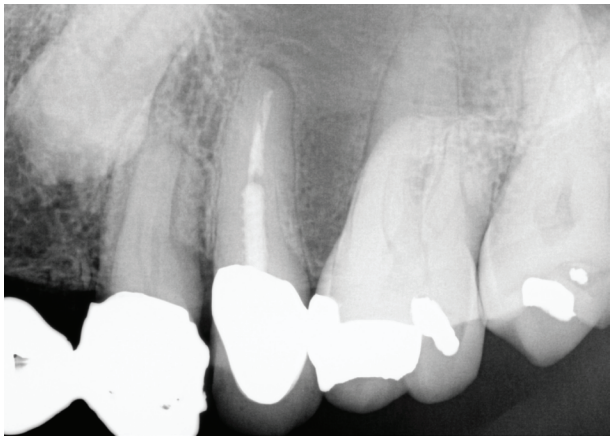

Fig. 1: Original two-unit cantilevered bridge replacing tooth #11

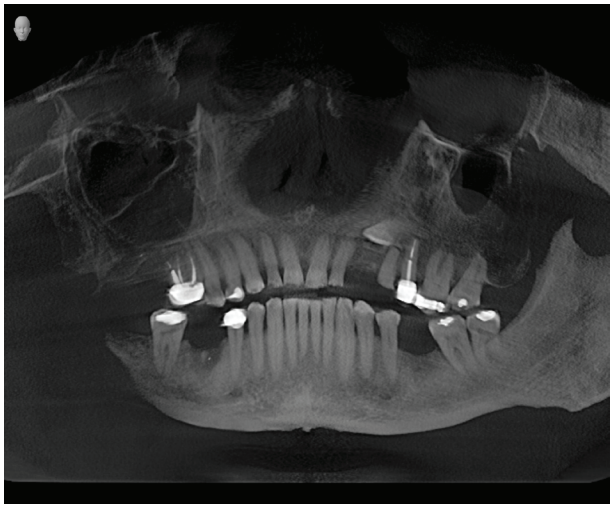

Fig. 2: Panoramic image of fractured tooth #12, missing tooth #11, and impacted canine.

penetrating the sinus. I selected a 3.6 x 6 mm fixture for the #11 site. The mesial distal measurement between #10 and #13 required that I plan to place these fixtures as close to 3 mm between implants as possible to avoid choking off the blood supply of the interstitial bone. The second challenge was that the implant replacing #12 would be an immediate implant.

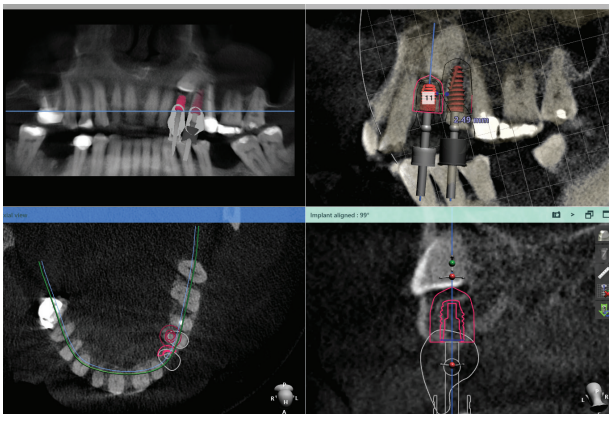

Fig. 3: 3Shape integrated implant planning software with virtual implant plan for 3.6 x 6-mm Astra Tech EV implant

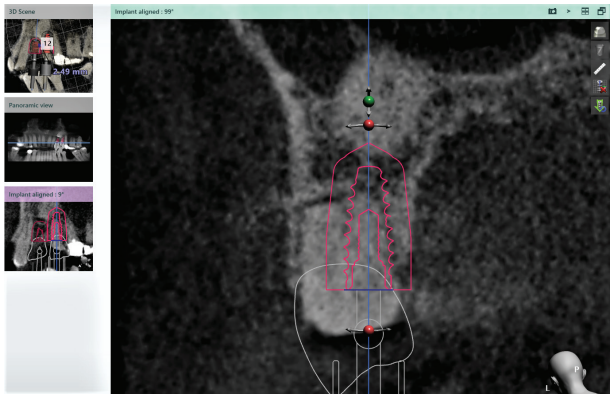

Fig. 5: 3Shape implant plan #12 immediate tooth replacement with a 4.2 x 10.5-mm BioHorizons Tapered pro fixture and 2.49-mm measurement between implants

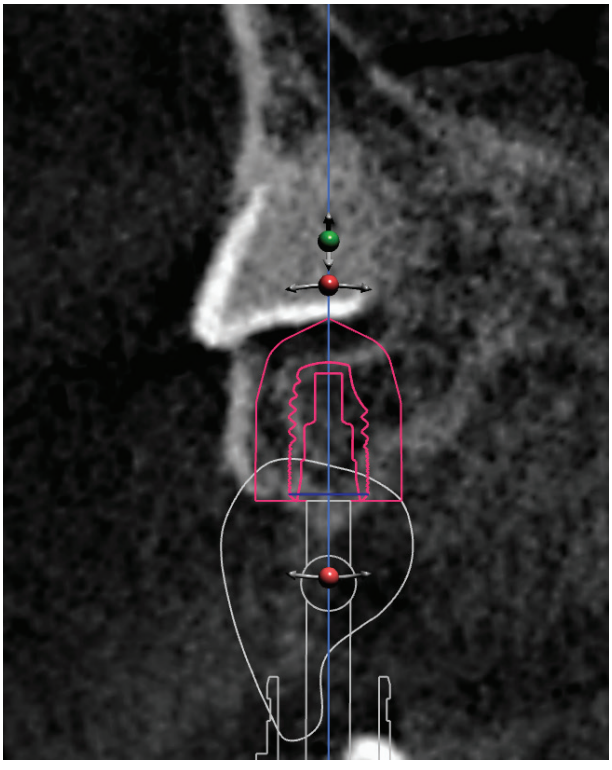

Fig. 4: Close-up cross-sectional implant plan for #11

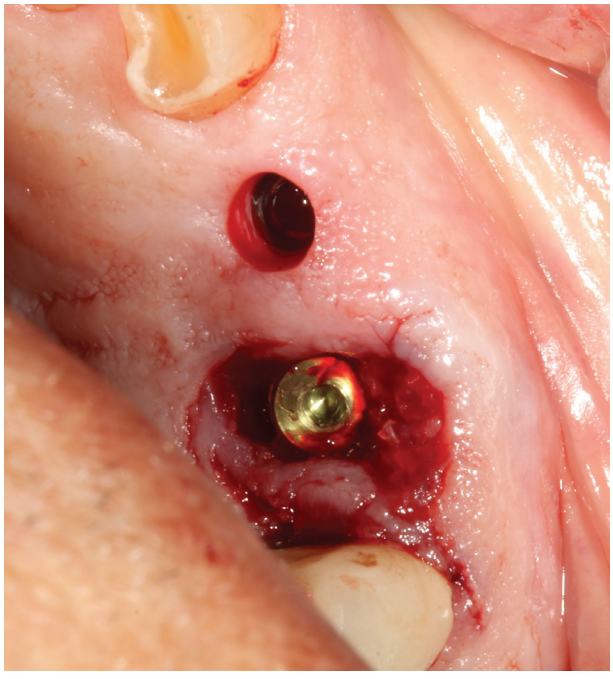

Fig. 6: Implant surgery completed. Immediate implant #12. Flapless implant #11

I selected a tapered pro 4.2 x 10.5-mm BioHorizons fixture to immediately replace tooth #12 and avoid penetrating the impacted tooth. The DICOM file and a CEREC® Primescan (Dentsply Sirona) optical impression was transferred to a digital lab for integration and planning the implant positions. I worked on the implant positions with my lab tech, who designed and produced a surgical guide that would be utilized during the surgery. You can see a radiopaque line directly under the apical tip of the virtual implant. I thought this represented a cortical floor and could be used as a stop for the apical position. The #12 implant was planned to skirt the impaction and be stabilized in the apical bone beyond the tip of the root. The distance between the two planned implants was 2.49 mm, a necessary compromise (Figs. 3–5).

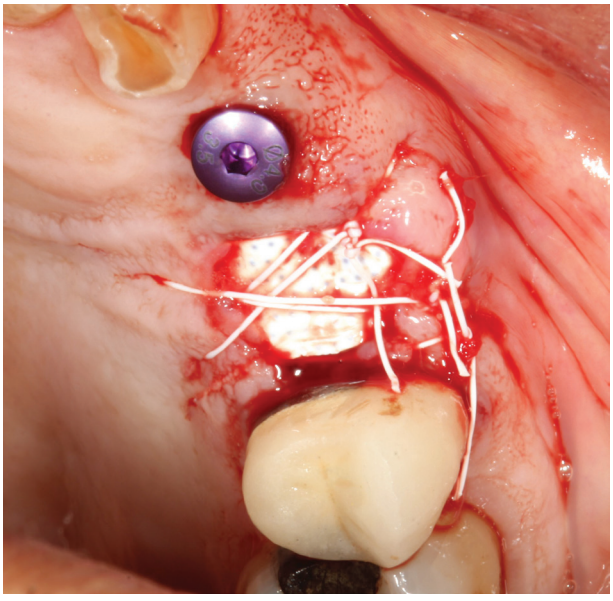

Fig. 7: Single-staged implant for #11 with heal design abutment and two-staged implant #12 bone grafted and covered with a d-PTFE nonresorbable membrane.

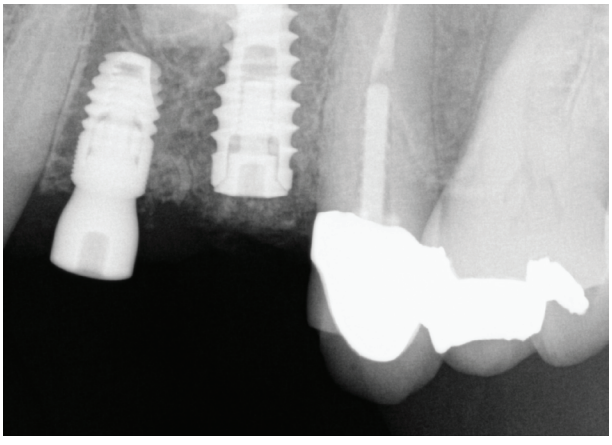

Fig. 8: 3.6 x 6-mm Astra Tech EV implant replacing #11 and 4.2 x 10.5-mm BioHorizons Tapered Pro implant immediate placement for #12. Tooth #11 is single staged and #12 is two staged.

Fig. 9: Peri-implant keratinized tissue and implants ready to be restored. Tooth #12 BioHorizons internal connection and #11 Astra Tech EV conical connection.

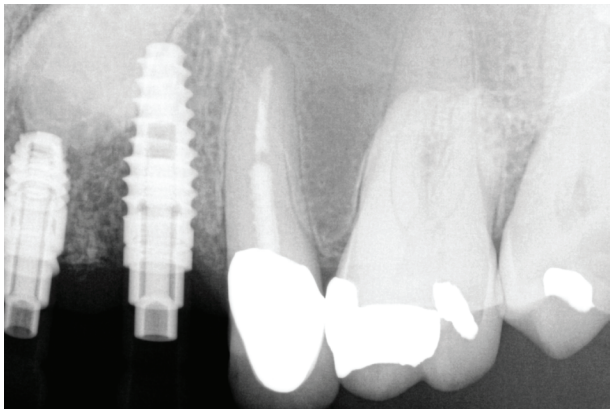

Fig. 10: Atlantis IO FLO ScanBodies site specific for optical scan

Fig. 11: CEREC® Primescan optical impression of Atlantis IO FLO ScanBodies. Note incisal wear of the anterior teeth.

The actual surgery included the extraction of the residual root in the #12 site, with an immediate implant and concomitant mineralized cortico-cancellous allograft bone graft to fill in a large buccal void after extraction. A d-PTFE cytoplast nonresorbable membrane was placed to contain the graft and because it is impervious to bacteria was left exposed to the oral environment to reduce the risk of complications. The #11 site was treated with a flapless fully guided implant installation and single staged. An uneventful surgery resulted in a successful integration and would be the foundation for a two-unit implant restoration (Figs. 6–8).

The #12 implant was uncovered after an appropriate healing phase and the implants were tested with Osstell RFA. The values were 80/80 for the 6-mm implant and

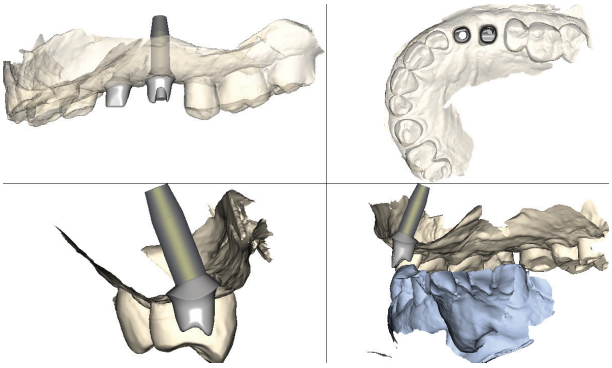

Fig. 12: Atlantis abutments #11 and #12 designed, paralleled, and ready for approval

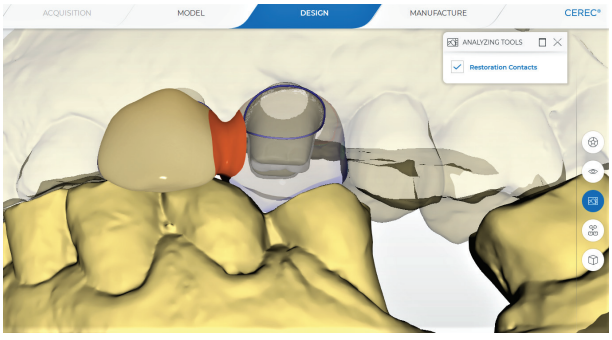

Fig. 13: CEREC® Primescan Design phase depicting adequate occlusal clearance for tooth #12

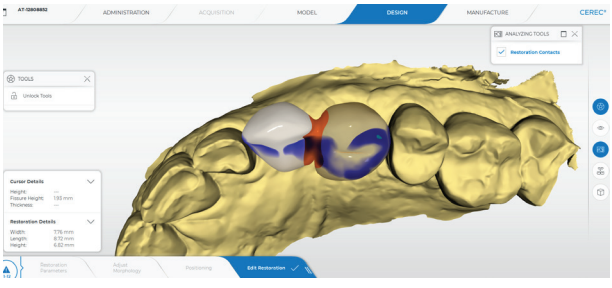

Fig. 14: Atlantis .dxd core file loaded into CEREC® Primescan to design and produce a two-unit IPS e.max bridge with anatomical connectors.

68/68 for the 10.5-mm implant. My restorative plan was to splint these two fixtures with a cementable IPS e.max (Ivoclar Vivadent) restoration retained by Atlantis abutments.

These fixtures were remeasured a month later and the ISQ values were 76/77 for #11 and 70/70 for #12. Recorded values indicated that the implants had osseointegrated and were ready to be restored. My CEREC Primescan optical impression of site-specific Atlantis

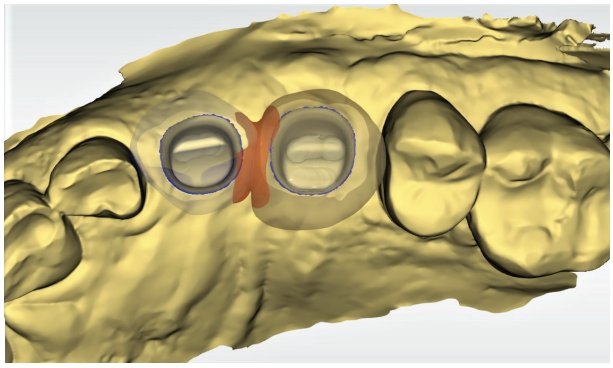

Fig. 15: Transparent view of two units and underlying Atlantis custom abutment margination

Fig. 16: Atlantis abutment insertion jig simplified the process with precision

IO FLO ScanBodies (Dentsply Sirona) was transferred to the Dentsply Sirona (DS) implant lab. Two distinct ScanBodies were used to capture the correct implant platforms and register the proper implant types in the Atlantis design software. The Atlantis technicians produced a very fast design and fabrication of these two abutments. I loaded the Atlantis core file into CEREC to design and mill a two-unit IPS e.max bridge that was stained and glazed before the abutments were returned to my office. The anatomical connectors in the CEREC software create a broad interproximal contact area so this bridge could resist fracture in function (Figs. 9–15).

The DS implant lab included a seating jig for the two abutments, which made the insertion visit effortless. The Astra Tech implant is a one-position-only internal connection and the BioHorizons fixture is an internal hex. Both were torqued in at the manufacturers' recommended values. Teflon tape filled in the access holes and was

Fig. 17: Atlantis abutments torqued in at manufacturer's recommended values: #11 at 25 ncm and #2 at 30 ncm.

Fig. 18: Definitive two-unit cementable IPS e.max bridge.

covered with resin. Note the occlusal clearance developed in the Design phase and how this vertical space made the cementable IPS e.max restoration possible. I decided to place a provisional restoration to begin the loading phase of this treatment. Due to the dark shading of the patient's natural crowns, mahogany and sunset staining was applied and baked to improve the esthetic quality of the definitive restoration. Two perfectly paralleled

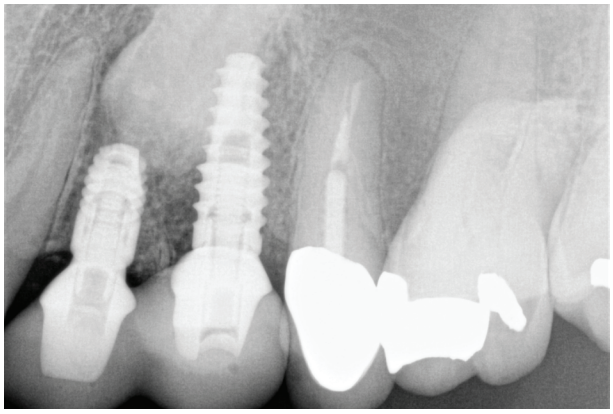

Fig. 19: Restored implants with Atlantis abutments and IPS e.max bridge. Note the marginal adaptation and crown morphology.

abutments established the foundation for an excellent fitting restoration and reduced the need for any occlusal adjustments. Implant protected occlusion was created to minimize functional overload and help maintain these implants. An occlusal night guard was fabricated for additional protection (Figs. 16–19).

This case report described a creative and pragmatic guided implantology workflow used to manage an advanced case. The result was a successful replacement of two teeth with dental implants and computer-aided design (CAD)/computer-aided manufacturing (CAM) restorations. Presurgical CBCT evaluation with enhanced diagnostics and advanced treatment options to plan, place, and restore implants made this complex case manageable. Short implants are a viable option to avoid vital anatomy and reduce the need for more invasive surgical options. This shortened the time for the final restoration and reduced the cost of treatment, which was completed within an efficient, productive CEREC implantology workflow.

For questions and additional information, Dr. Ramirez can be reached at info@dranthonyramirez.com.

The DS implant lab included a seating jig for the two abutments, which made the insertion visit effortless.

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The Life Cycle of a Dental Practice

Jonathan Ford, D.D.S.

At some point in your dental career, you will hit the doldrums. Some call in burnout. Some describe it as an overwhelming frustration. Some call it hitting the wall. Whatever you call it, it will happen to every practicing dentist at some point in their career, and it may happen more than once. It may occur to younger dentists, when they have survived their first few years in practice and are looking for something more. It may occur to a seasoned dentist, who just isn't getting fulfillment from dentistry anymore. This frustration is not unique to the profession of dentistry. It is inherent in all living things. It isn't unique just to humankind. I want to take a couple of big steps back and look it from the standpoint that every living, organic thing goes through this life cycle.

All living systems go through four phases. 1) Repose; 2) growth; 3) stagnation; 4) decay. Look at the seasons. Winter is repose. Spring and early summer is growth. Late summer and into fall are the stagnation phases. Finally, fall into winter is decay. Animals go through this process as well. The feasts of summer turn into the famines of winter (Fig. 1).

Businesses of all sizes cycle through this process as well; a hiring frenzy with record profits, followed by layoffs with the possibility of substantial losses. In some cases, these businesses are able to pivot and use those moments of decay as springboards for future growth. The key is recognizing which stage you or your practice is in. The goal is to maximize the growth cycles, while transitioning through the stagnation, decay, and repose cycles as quickly as possible. It is the ability to see the signs and strategically create visions and plans for the future.

Some dental practices can do this. Most cannot. In my opinion, most dentists and their practices have substantial growth in their early years. They begin to plateau at the $1.0–1.2 million mark and enter the phase of stagnation. There are only so many fillings or crowns that a dentist can do in the current insurance-based dental market. In the stagnation stage, frustration starts to appear or, even worse, apathy. Profits begin to flat line or decline.

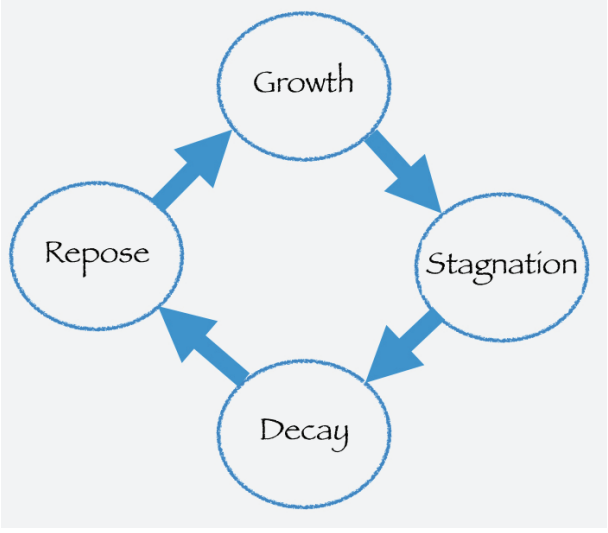


Fig. 1: Four phases of living systems

Fees stay flat or decrease. Staff wages go up. Overhead continues to grow. Many seasoned dentists begin to think about just riding this phase out or coasting to retirement. Eventually, the stagnation turns into decay and many dentists turn a blind eye. The key is the ability to forecast these changes, to use these moments as a springboard toward future growth.

My practice went through a similar process. I joined the practice in 2007 and for the first seven or eight years, I was comfortable just getting my feet wet. I was refining my drill and fill skills. We plateaued at $1.2 million and some frustration started to kick in. First, my profits started to trickle downward. Second, I felt like I hit a wall with my clinical skills. I wanted something more. My practice needed to transition, but more importantly, I needed to be the one to initiate the change. I needed to take steps out of my comfort zone. I needed to be comfortable being uncomfortable.

The transition that occurred was bringing some technology into the practice and using that as a catapult to foster growth. However, it had to be the right technology. I considered digital impression systems first. I learned about

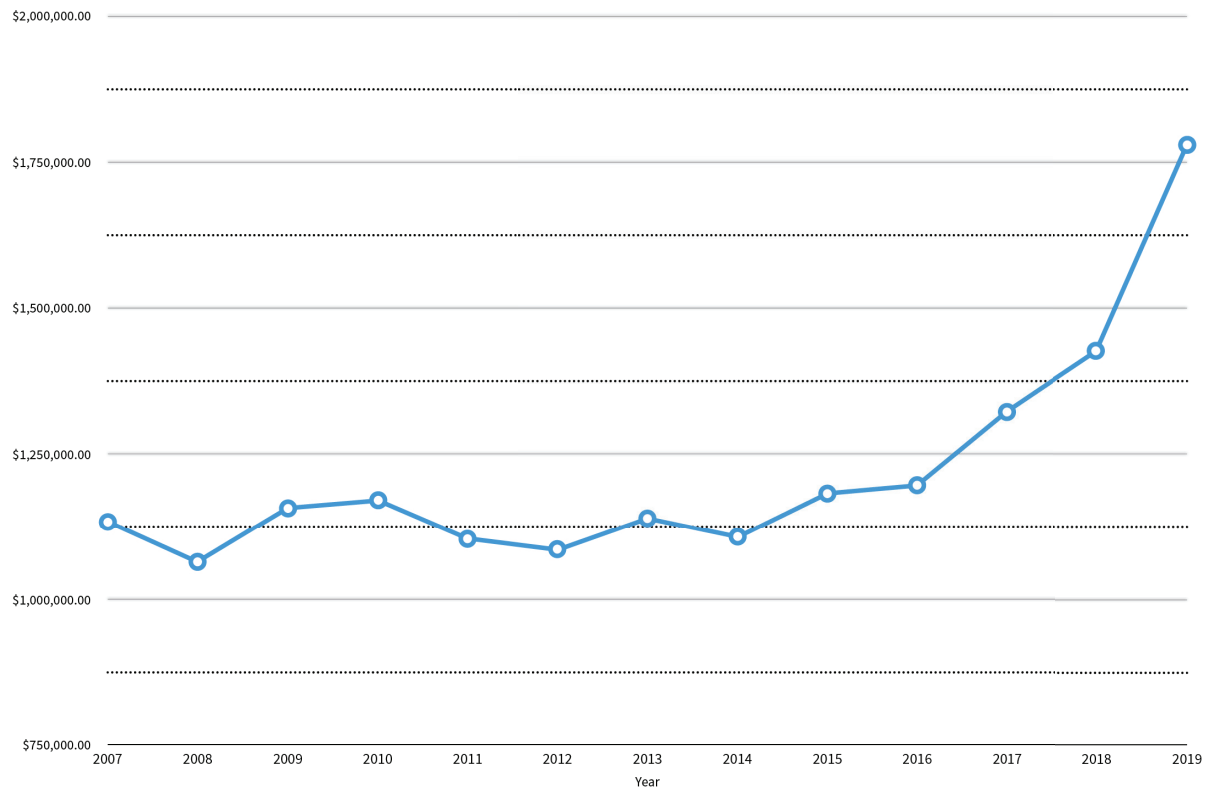


Fig. 2: Growth of practice

each of the major players out there. It was interesting but didn't create leverage to foster the growth. It was a replacement for what was already being done.

That's when CEREC® was introduced to me and it hit all the things that I was looking for. It created a "WOW" factor with patients, but it also allowed me to do things that I wasn't capable of doing before. It created more efficient crown procedures. It significantly lowered the cost of implant restorations. We gained higher case acceptance with clear aligner therapy like SureSmile. It also challenged me and fostered excitement throughout the practice.

CEREC alone is just the tip of the iceberg. Pairing CEREC with 3D technology takes a productive practice and puts it on steroids. You diagnose at an entirely new level, catching periapical abscesses in their infancy. You see potential airway issues, which allow you the opportunity to discuss Obstructive Sleep Apnea with patients. It also gives general dentists the ability and confidence to place dental implants as well, if not better, than their specialist counterparts.

The CEREC system is always evolving and adding to the repertoire of procedures it can offer. It also gives you something to work on, learn, and perfect. It creates an opportunity for lifelong learning and challenges your mindset on what you thought was possible.

As I entered into the CEREC world, I took this piece of advice seriously. Alan Watts once said, "The only way to make sense of change is to plunge into it, move into it, and enjoy the dance." This "dance" has increased the fun in my practice. It has increased the fulfillment in my practice. It also increased the profits in my practice by growing the practice close to 50% in three years (Fig. 2).

So whether you are in a stage of growth and want to extend it; or you are at a stage of stagnation, decay, or repose, and need to do something to your practice to shake it up, consider CEREC, pair it with an ORTHOPHOS or GALILEOS, and enjoy the dance.

For questions and additional information, Dr. Ford can be reached at drjonathan@forddentalgroup.com.

Using VITA SUPRINITY PC to Restore Discolored Teeth Affected by Fluorosis

Daniel Vasquez, D.D.S.

Abstract

The following restorative case features a 62-year-old female patient who presented with extreme discoloration due to fluorosis. As a result of the discoloration, she was embarrassed to smile. The determination was made to start with the upper restorations, and then have the patient return for the lower restorations a few months later, as funds became available. The challenge was to find a suitable restorative material that was strong enough to last and that would also look esthetically pleasing. In this case, VITA SUPRINITY PC (VITA Zahnfabrik) was the chosen material. The goal was to create a durable, 10-crown, upper restorations with a natural appearance and pleasing esthetics.

Patient Case

A 62-year-old female patient presented with extreme discoloration due to fluorosis. She had been a patient of my practice for seven years and had very good oral hygiene, but the water in her hometown contained a lot of fluoride, causing fluorosis and discoloration. As a result of her discoloration, she was embarrassed to smile. After conducting a clinical evaluation and taking X-rays and photographs, the decision was made to start with the upper teeth and then move to the lower teeth a few months later, as funds became available. The decision was made to use VITA SUPRINITY PC (VITA Zahnfabrik) for its strength and esthetics for the 10-crown, upper restorations.

Fig. 1: A 62-year-old female patient presented with discoloration due to fluorosis.

Material

VITA SUPRINITY PC, which is a zirconia-reinforced lithium silicate ceramic (ZLS), was selected for the upper reconstruction. The material is incredibly strong and provides amazing esthetics. It also offers excellent polishing capabilities and easy manual finishing after milling, providing natural translucency, fluorescence, and opalescence. With its simplified processing and high-edge stability, the material also offers a precision fit and can be crystallized without auxiliary firing paste.

Preparation

The patient agreed to the proposed treatment plan and we set up the first appointment. At that appointment, we collected the necessary data for the CEREC® Smile Design Process (Dentsply Sirona), including a medical history questionnaire, a full clinical exam, and photos (Figs. 1–2). We created a slide presentation to visually outline the treatment steps for the patient using the online application called Smile Designer Pro (Fig. 3). Initial impressions were taken

Fig. 2: Patient was prepared for full mouth X-rays and photographs.

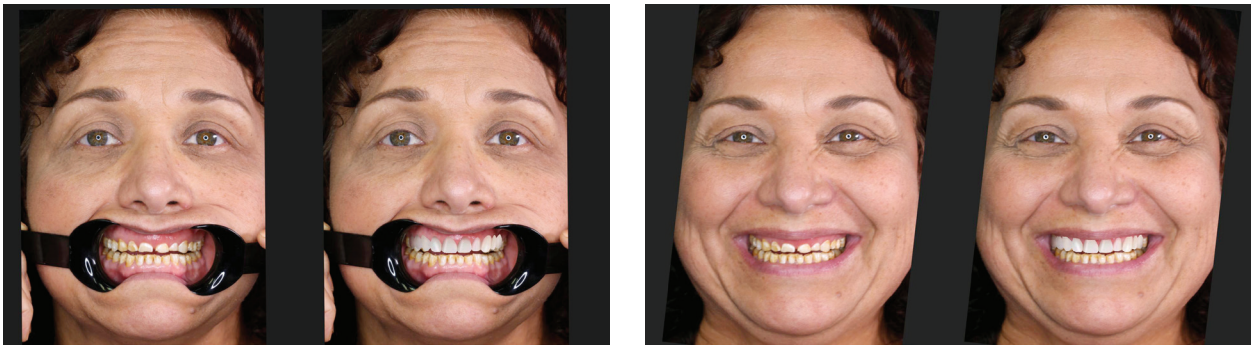


Fig. 3: A slide presentation using Smile Designer Pro was created.

with the CEREC Primescan (Dentsply Sirona) and then used to create 3D printed models, which are the key for ideal mock-ups. CEREC digital study models and bite registration were also utilized.

A buccal wax-up was created and then transferred to the patient's mouth (Fig. 4). We produced a silicone key, filled it with temporary material and transferred it to the patient's mouth. At this point, the patient was able to see herself with the proposed restoration. We call this stage the emotional mock-up, as many patients become quite emotional when they are able to visualize how they will look after treatment (Fig. 5). The patient loved the way she looked and was ready to move forward with the treatment plan (Fig. 6).

Fig. 4: A buccal wax-up was created.

Fig. 5: An emotional mock-up was created and placed in the patient's mouth.

Treatment

To begin, we opened the CEREC Software 5.1.1 (Dentsply Sirona) to the Administration Phase and added the material selected, which was VITA SUPRINITY PC (Fig. 7). We proceeded with a full-arch scan from the preparation and mock-up and made a Biocopy folder (Fig. 8). Once that was completed, we set the Model Axis and the Insertion Axis, two steps that are key for the ideal milling of the restorations and the Manufacture Phase (Fig. 9). Next, the upper and lower digital models were articulated and ready for the Design Phase (Fig. 10). We initially started with the upper restorations; the patient will return at a later date for the lower restorations.

To create the restoration proposal, I used the grid to align the teeth to the right position and the right length (Fig. 11). I utilized the CEREC Smile Design software application to import an image of the patient's face and the models from the digital scan. With this new application, I was able to align the teeth directly into the patient's

Fig. 6: The patient loved the look and approved the treatment plan.

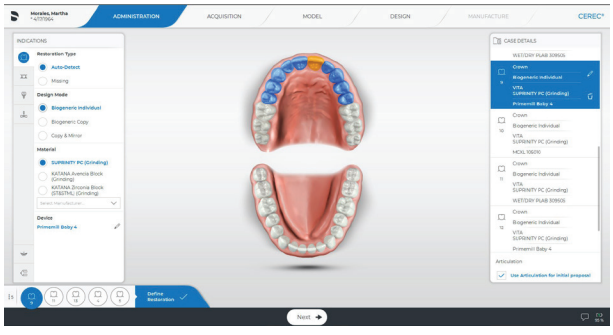


Fig. 7: We opened the CEREC® Software 5.1.1 to the Administration Phase and added the material VITA SUPRINITY PC.

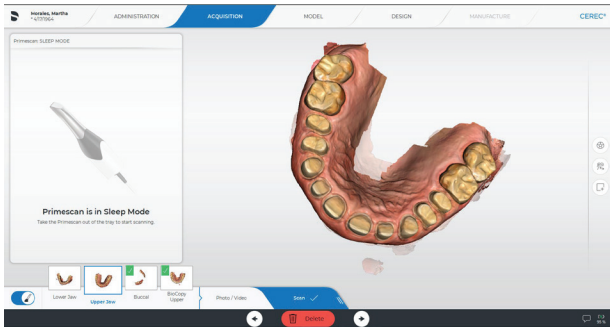


Fig. 8: We proceeded with a full-arch scan and made a Biocopy folder.

facial image and finalize the restoration design using the patient's face and smile (Fig. 12). The application also provides design tools to allow for small changes and touch-up actions, such as moving the position of the teeth or modifying their size (Fig. 13).

Milling

We selected VITA SUPRINITY PC as the material for the restoration, primarily for its high strength and

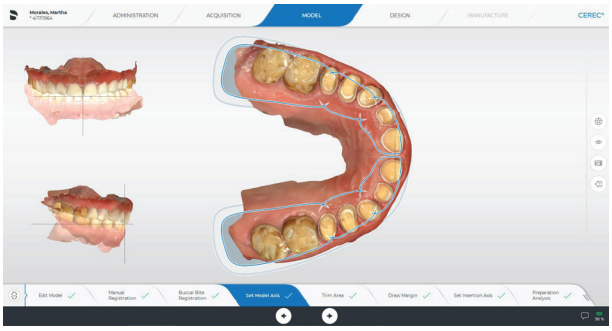


Fig. 9: The Model Axis and the Insertion Axis were set.

Fig. 10: The upper and lower arches were articulated.

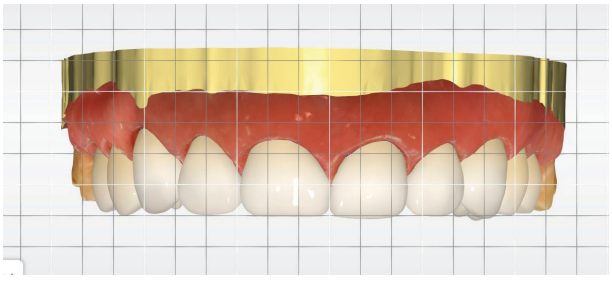
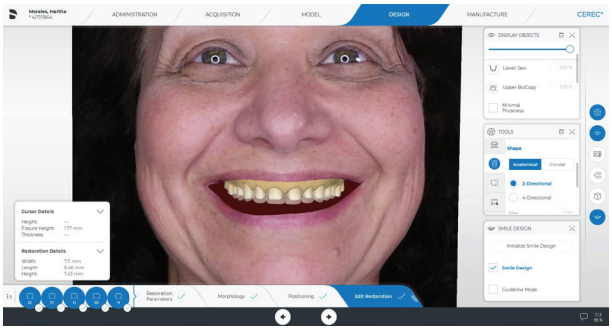
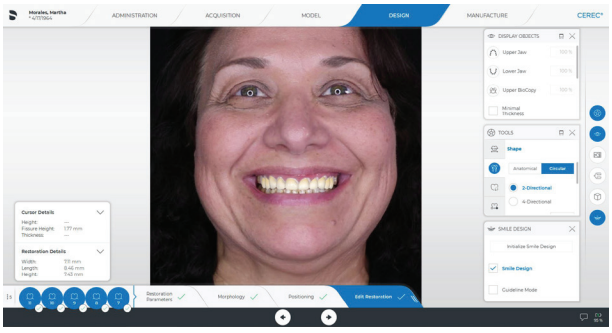


Fig. 11: The Grid Mode was used to align the teeth.





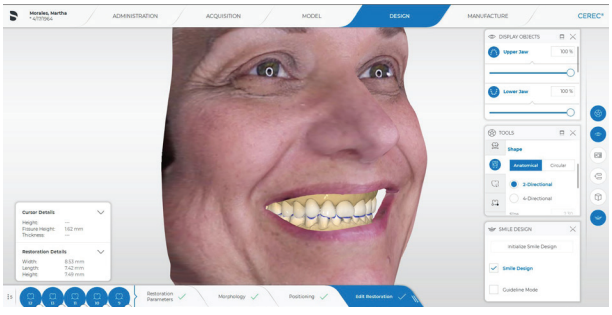


Fig. 12: CEREC® Smile Design was used to import an image of the patient's face and digital scan models.

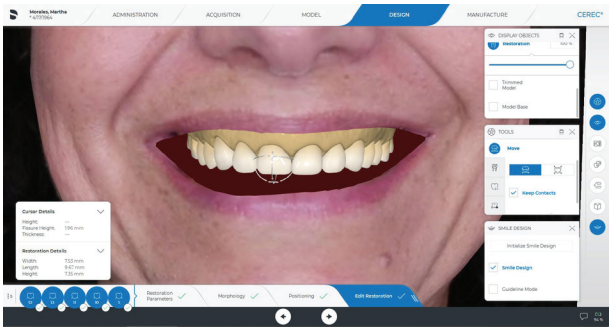


Fig. 13: Design tools were used to make small changes.

Fig. 14: VITA SUPRINITY PC was selected as the restoration material.

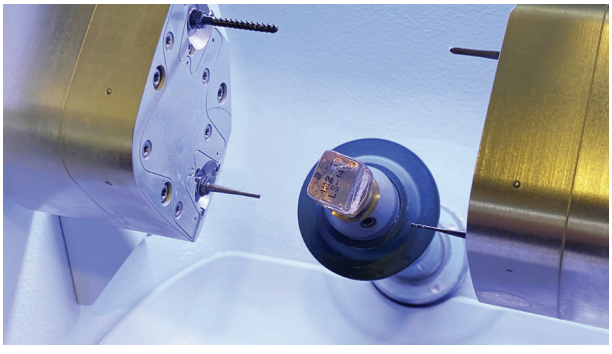


Fig. 15: The all new CEREC® Primemill on the Super-Fast setting was used to mill the restorations.

brilliant esthetics (Fig. 14). The all-new CEREC Primemill (Dentsply Sirona) was used for the milling of the restorations using the Super-Fast milling setting (Fig. 15). On average, a single restoration took about six minutes each to mill (Fig. 16). To remove the restoration from the block, I used a red fine diamond bur. I used the same bur for contouring the interproximal line angles and the tooth formation to create the ideal emergence, shape, texture,

Fig. 16: On average, a single restoration took about six minutes to mill.

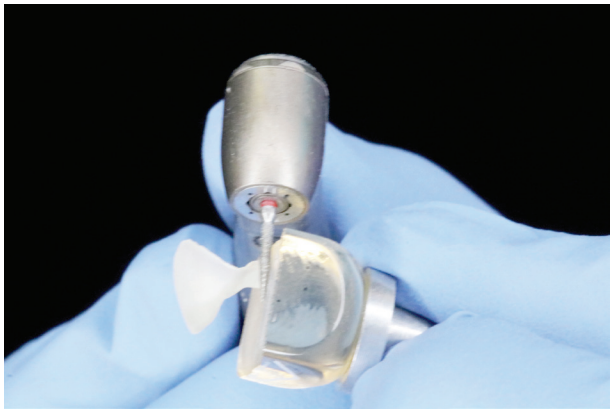


Fig. 17: A red fine diamond bur was used to remove the restoration from the block and for contouring the interproximal line angles and tooth formation.

Fig. 18: The sprue connector was removed and the SRS100 Sprue Removal System, diamond-infused BlueBerry was utilized to smooth the connector/restoration interface.

and form (Fig. 17). The sprue connector was quickly removed using the diamond-infused white section of the

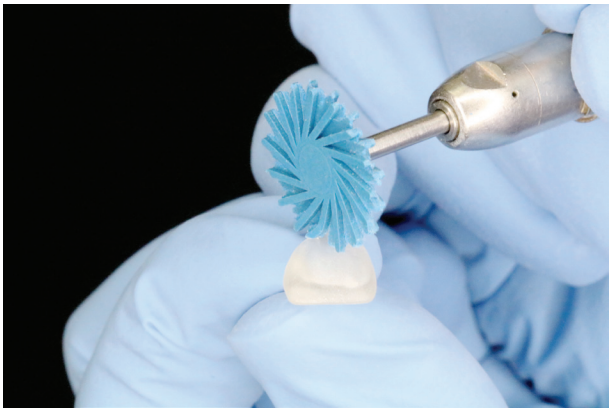


Fig. 19: The Coarse Twister and Blue Medium Twister were used to pre-polish the ceramic.

Fig. 20: The restorations were crystallized in the VITA SMART.FIRE furnace.

SRS2 Step Sprue removal instrument (Wagner Precision Rotary). The SRS100 Sprue Removal System, diamond-infused BlueBerry (Wagner Precision Rotary) was utilized to smooth the connector/restoration interface (Fig. 18). For polishing, I used the Green Coarse Twister (Meisinger) to

Fig. 21: The restorations were characterized with VITA AKZENT Plus Stains.

Fig. 22: The restorations were bonded with a thin layer of PANAVIA SA Cement Universal.

take off the marks of the milled burs, and a Blue Medium Twister (Meisinger) to pre-polish the ceramic and achieve the optimal surface quality prior to staining and glazing (Fig. 19). The restorations were finished, polished, and passively fit on the printed model. The next step was crystallization of the zirconia-reinforced, high-strength glass ceramic restorations in the VITA SMART.FIRE furnace (VITA Zahnfabrik) (Fig. 20).

Characterization

To characterize the restorations, I selected VITA AKZENT Plus Stains (VITA Zahnfabrik) in the paste, using blue and white (Fig. 21). The restorations were placed in the CEREC SpeedFire sintering furnace (Dentsply Sirona) for stain fixation, followed by an application of VITA AKZENT Plus Glaze LT spray (VITA Zahnfabrik) for a high-gloss finish.

With this new application, I was able to align the teeth directly into the patient's facial image and finalize the restoration design using the patient's face and smile.

Fig. 23: The patient is pleased with the overall esthetics of her final restorations.

Bonding

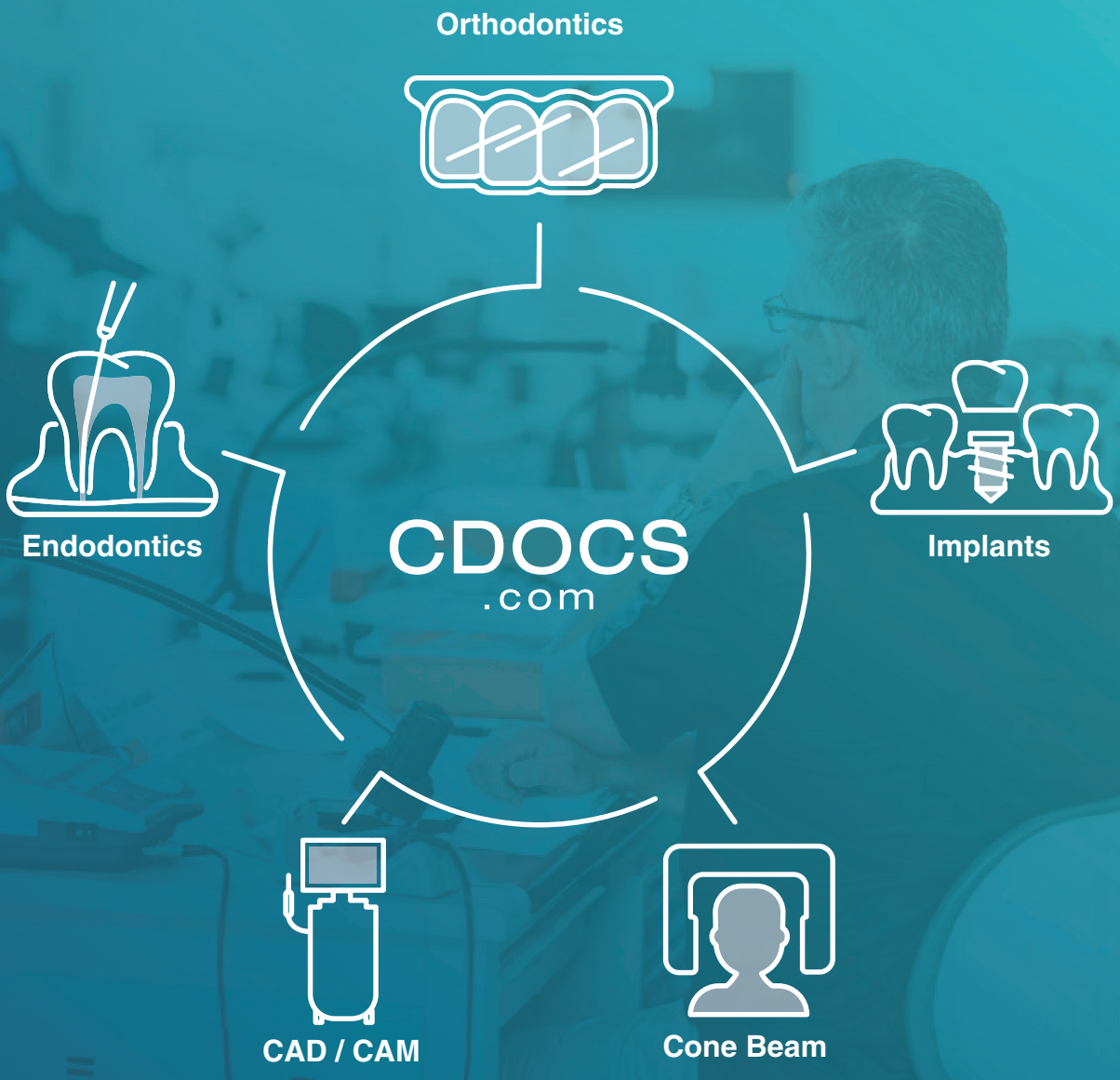
Prior to bonding, we treated the restorations with 10% hydrofluoric acid for 60 seconds, then thoroughly rinsed and air-dried. CLEARFIL Universal Bond Quick (Kuraray) was applied to each restoration for one second and then air-dried prior to use of the cement. We prepared the intaglio etching with ceramic etch for 30 seconds and then applied a thin layer of PANAVIA SA Cement Universal (Kuraray) in a transparent color for the final cementation. There was no need for a separate priming step, as a silane coupling agent is built into the paste (Fig. 22). The restoration treatment was completed, exhibiting a natural translucency, opalescence, and fluorescence.

Conclusion

With this restoration, we were able to achieve a beautiful finish with an opalescent property that makes the restorations look very natural. The combination of strength and esthetics was achieved using VITA SUPRINITY PC ceramics. The patient is no longer embarrassed to smile and is pleased with the overall esthetics of her final restorations (Fig. 23). We will be restoring the lower arch in the next few months.

For questions and additional information, Dr. Vasquez can be reached at danielvasquezdds@gmail.com.

Which Educational Path Will You Take?



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Cement-Retained Zirconia Abutments Are Awesome

Meena Barsoum, D.M.D.

I know that is a pretty bold claim, especially because the majority of the dental community has been programmed to steer toward screw-retained restorations whenever possible. And I completely understand that reasoning. Cement sepsis is a significant risk that we need to properly control and avoid as it can lead to a high rate of peri-implantitis. However, screw-retained restorations also can have complications in certain instances. I would like to discuss some of the benefits and drawbacks of each solution, as well as describe a novel product that provides some added flexibility to our CEREC® implant workflow.

One of the most enjoyable procedures in all of dentistry for me is restoring a single implant crown. When you calculate the required chairtime and material costs, it can easily be the most profitable procedure you can perform in dentistry. Plus, it's quite enjoyable to have a high level of control over the design and outcome of the prosthesis. However, as many of you have probably experienced, it also can be a very challenging process when surgical placement and prosthetic demands are not in alignment, especially when implants are being placed subcrestally. More and more bone level implant systems are promoting a subcrestal placement. This provides some added benefits with bone remodeling and minimizing thread exposure. However, this poses a challenge with our traditional titanium base solution. The current stock titanium bases we use are 0.8 mm in collar height. For simplicity, let's say 1 mm. The challenge comes with seating this 1 mm collar height on a 2-4 mm subcrestal platform. You either will create an extensive amount of pressure on the surrounding bone where you may not even be able to seat the restoration, or you would need to recontour the surrounding bone to allow restorative space. This recontouring takes away some of the advantages we gained with a subcrestal placement.

Thankfully, we have a solution that addresses this very challenge. TruAbutment (Irvine, CA www.truabutment.com) developed a variable tissue height titanium base that works directly with our CEREC software. These titanium bases come in 1-, 2-, 3-, and 4-mm gingival heights that can apply to a large variety of clinical presentations (Fig. 1), and they work with many of the most popular implant systems on the market. The beauty of this solution is that the components will work together seamlessly with your existing restorative components. Your existing CEREC restorative blocks will fit perfectly with this TiBase as the chimney portion is unchanged. You simply choose the specific gingival height you want from the website and it will be shipped to your door within a couple of days. It could not be any easier.

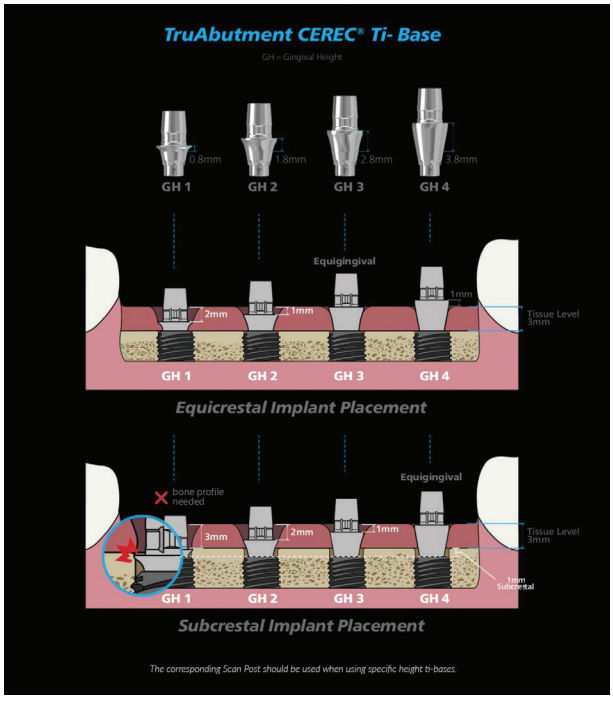

Fig. 1: TruAbutment CEREC® TiBases. These come in various tissue heights to accommodate deep, subcrestal placement of implants.

There is one caveat, however. Our CEREC software was programmed to work with 1-mm gingival height components. So, if we take scans with our existing

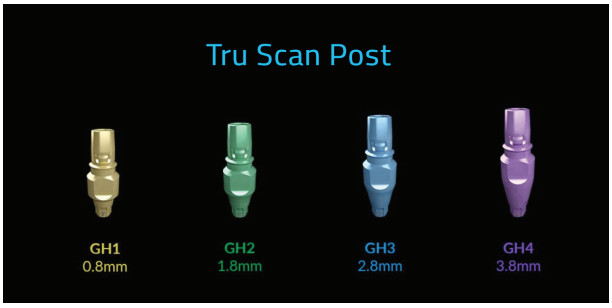

Fig. 2: Tru ScanPost: These ScanPosts come in all four gingival heights and you can purchase them for each size implant you are restoring. Like other imaging components, these can be sterilized and reused.

Fig. 3: TruAbutment ScanBody. This ScanBody is reusable, but contains the exact same geometry as the standard gray ScanBodies, so the software can read and position the implant correctly.

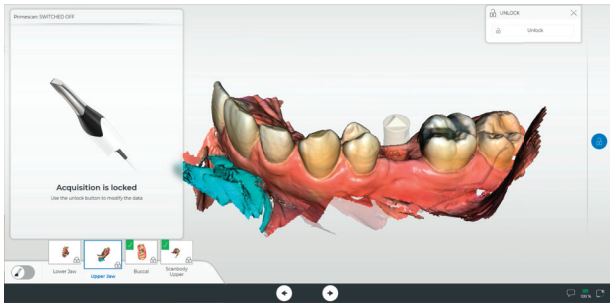

Fig. 4: Image to the midline and at least seven total teeth.

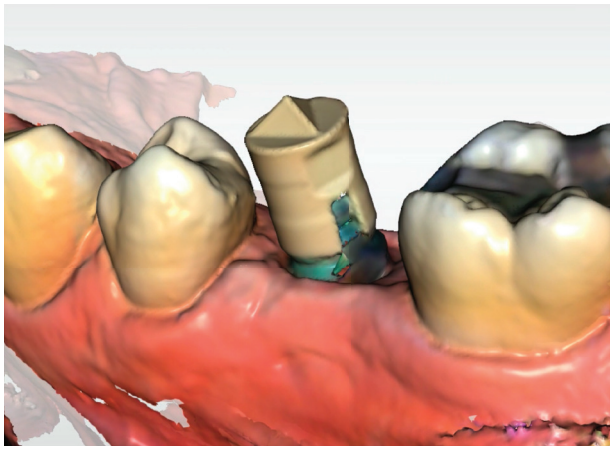

Fig. 5: TruAbutment ScanBody

ScanPosts and ScanBodies, we would only be able to restore the 1-mm TiBase. TruAbutment thought of this and developed a corresponding ScanPost kit that works with each size gingival height (Fig. 2). You simply place the ScanPost in the implant and image either the stock gray ScanBody or use one of TruAbtument's ScanBodies that come with the kit (Fig. 3). They both work exactly the same. The key is to obtain the image with the corresponding parts and pieces that match the specific gingival height TruAbutment you are restoring.

The other major challenge we can experience with screw-retained restorations is contact interference with adjacent teeth. With traditional crown and bridge restorations, if a restoration does not seat fully, we immediately adjust the proximal contacts as needed until the restoration seats passively, while maintaining a positive contact. However, with a screw-retained implant restoration, it is not that simple. Remember, the implants we are restoring today are all internal connection implants. This means that the prosthetic component

You simply choose the specific gingival height you want from their website and it will be shipped to your door within a couple of days. It could not be any easier.

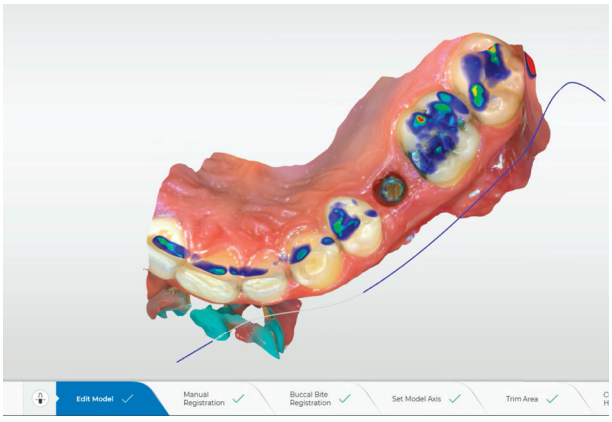

Fig. 6: Edit Model step — use the Cut tool to remove any artifacts.

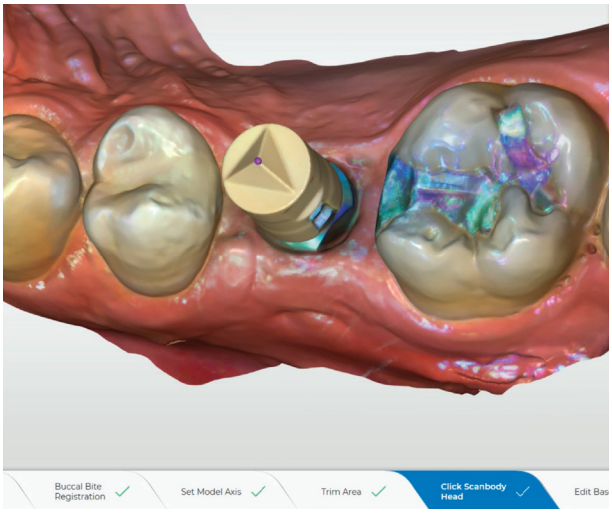

Fig. 7: Select ScanBody Head step is automated, but is still verified.

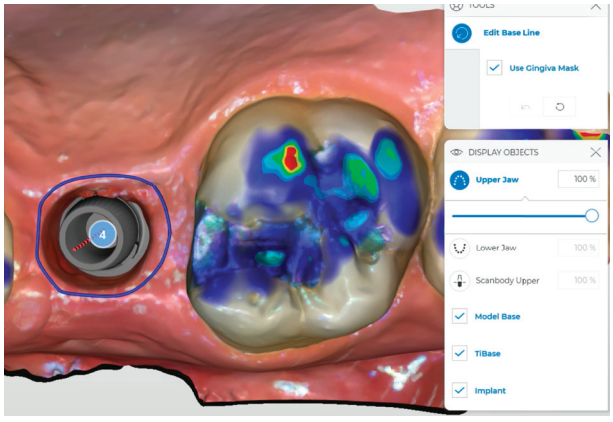

Fig. 8: Base Line

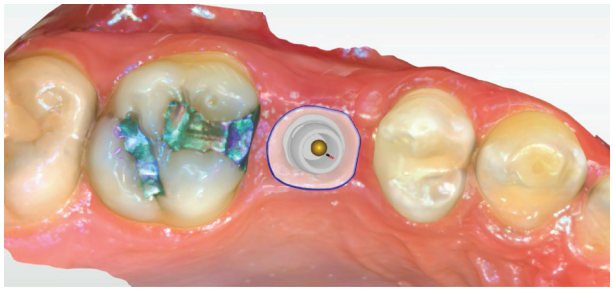

Fig. 9: Set Restoration Axis step — this controls the path of insertion of the final cement-retained crown.

needs to engage the internal aspect of the implant. This engagement is extremely precise as the components are machined to a very high tolerance. So, when we think about seating a screw-retained restoration, we not only need to have contacts that are passive yet present, but we also need to allow the titanium base component to passively seat within the internal connection of the implant. Now, in a perfectly placed implant, this is typically not an issue. However, if the long axis of the implant is not parallel to the long axis of the proximal contacts of the adjacent teeth, it will not seat fully. This can pose a problem because our options to correct this are limited. If I adjust the contacts, I will eventually seat the restoration, but I will be left with an open contact. And since I've already bonded my final restoration to the TiBase, I don't have the option of adding porcelain and performing a correction fire. Alternatively, I can perform an enameloplasty on the adjacent teeth, but that also can be quite extensive, and in some cases unnecessarily damaging. If I instead choose a cement-retained restoration, I can easily seat the abutment without any worry of the adjacent contacts. The final crown is cemented on the abutment just like with any natural tooth. And if I miss a shade or have an open contact for whatever reason, I can easily perform a correction fire as needed.

Let's go through an entire design exercise together. Implant design can be challenging if you don't follow a defined sequence. Here is the step-by-step detailed case of a cement-retained restoration using a GH2 TruAbutment TiBase.

In the acquisition phase, it is always important to image at least seven teeth in the quadrant. We also want to image at least to the midline. This allows the software to better align the Model Axis and produce a better initial proposal (Fig. 4). We also need to image a separate catalog

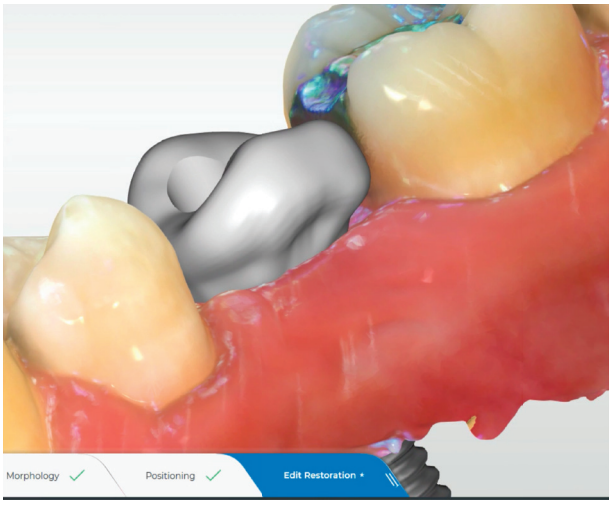

Fig. 10: It is common to have some irregularities in your initial proposals with implants, but we have tools we can use to easily correct it.

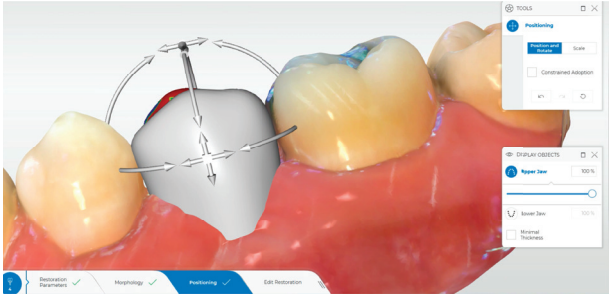

Fig. 11: Positioning tool is an easy way to correct proposals very quickly. Remember to uncheck Constrained Adoption.

for the ScanBody. In Fig. 5, I used the TruAbutment ScanBody. It has a definitive "snap" and can be sterilized and reused. Once all the image catalogs are complete, we can now move to the model phase. In the current CEREC Software 5.1.1, many of these steps are automated for us, but there are a few things I like to verify. Specifically, I like to edit my models for implants and remove any artifacts that could potentially affect the initial proposal. Tissue, cheek, retractors, etc. can confuse the software and affect the proposal. In the Edit Model Phase, I use the

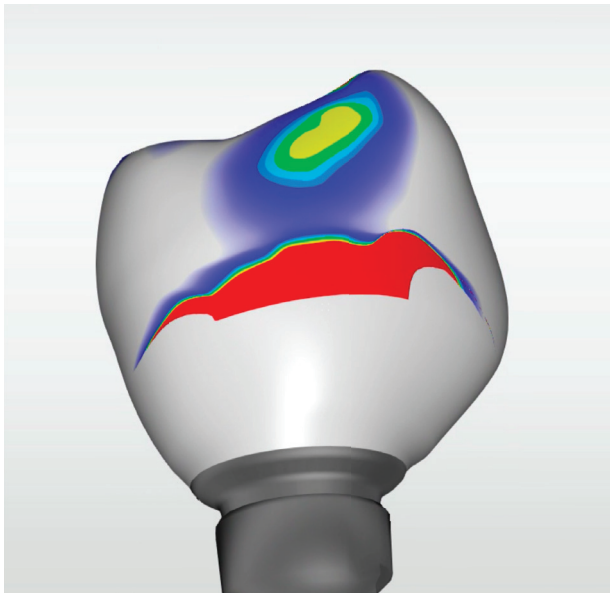

Fig. 12: I typically set my proximal contacts a little heavier than usual, giving me room to adjust, especially if this was a screw-retained restoration. I can easily remove material, but adding on is quite difficult after the components have been bonded together.

Cut tool (Fig. 6) to clean up those artifacts. It is advisable to perform this in the Model Phase and not in Acquisition as it can overload the system and cause a crash.

Many of the steps in the Model Phase are automated, such as the Model Axis and the Select ScanBody step. I still like to verify that everything is correct before moving forward (Fig. 7). However, there is a very important step that creates a lot of confusion for many users. The dreaded Edit Base Line step. The most common question we get in our Implant Restorative workshop is when to use the Gingiva Mask and when not to. To keep things simple, I recommend not using the gingival mask unless you are:

1. restoring an implant where the tissue was trained prior, either with a custom healer or a provisional, and you want to copy that tissue, or
2. restoring an implant with a cement-retained abutment solution.

If I instead choose a cement-retained restoration, I can easily seat the abutment without any worry of the adjacent contacts.

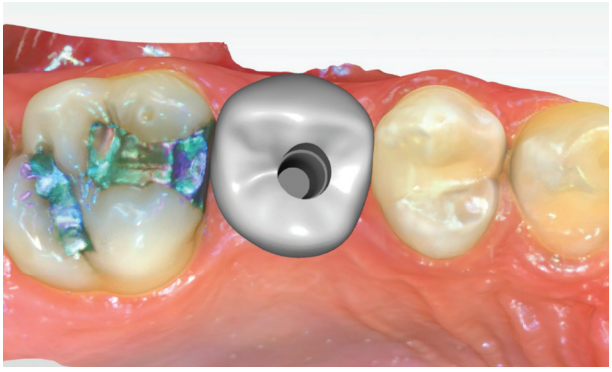

Fig. 13: Spend time designing the final restoration to as ideal as possible.

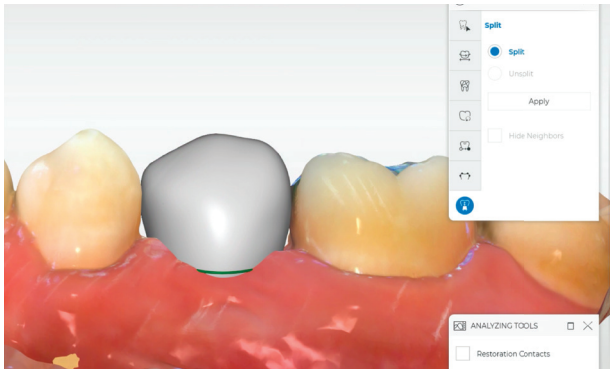

Fig. 15: Using the Gingiva Mask in the model phase controls the split line of the custom abutment and the crown.

Fig. 14: Final contour of the restoration. It is not ideal to make major changes to the proposal after you split them.

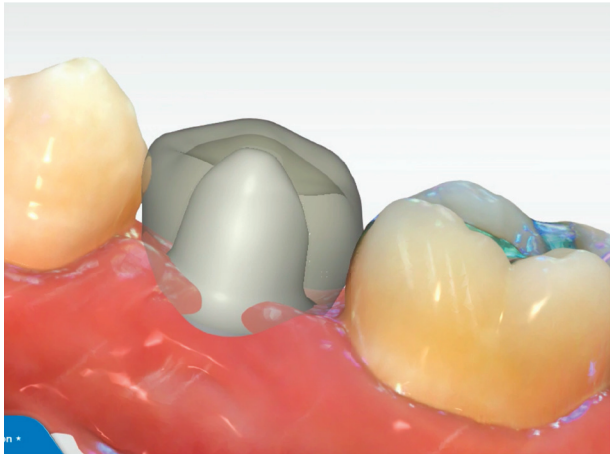

Fig. 16: Initial proposal of the custom abutment shows a very tall abutment with a very wide shoulder.

The first indication is obvious. Let's copy nice healthy tissue so our emergence profile is unchanged and the tissue contour is maintained. The second indication is a little more confusing. The reason I choose to use the Gingiva Mask is to help me control the future split line of my restoration. The blue line you see in Fig. 8 will eventually determine where my initial split of the restoration occurs. This makes my design work less involved with moving margins up and down. The downside of this technique is that my emergence profile may require a little more smoothing and contouring as the software will copy the tissue that was imaged. With the Form-Smooth and Shape-Circular, we can easily correct any contour issues in the emergence profile, so this is not a huge concern.

The last step in the Model Phase is to set the Restoration Axis. Think of this as the "preparation" of your custom abutment. When we prepare a natural tooth, we want the path of insertion and draw to be as close to the long axis of the adjacent teeth as possible. This step helps us control that "prep axis" of the abutment so our cement-retained restoration will seat passively without interference of adjacent teeth. The easiest way to handle this step is to first align the model so you are looking directly down the long axis of the adjacent teeth. And then take the arrow indicating the long axis of the implant restoration and move it so it covers your previously drawn Base Line. It's that simple. Now your implant abutment axis will be parallel to the axis of the adjacent teeth (Fig. 9).

Often with implant restorative designs, your initial proposal may not be ideal (Fig. 10). Rather than panic and start using your tools to correct it, take a step backward to the Positioning tool and use that to pre-position your

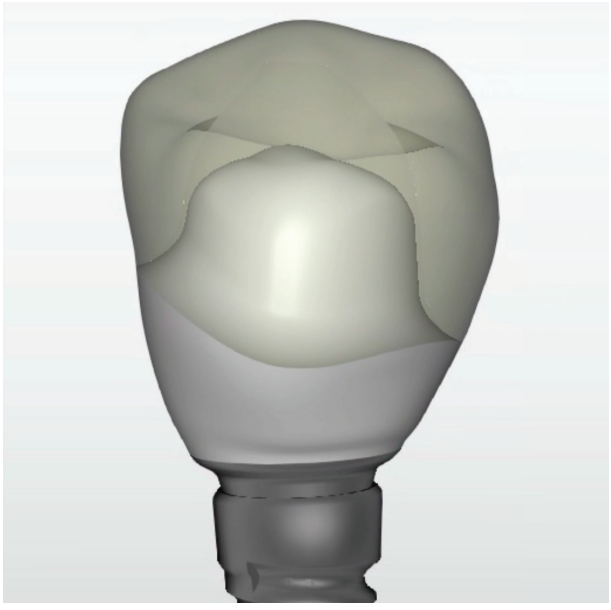

Fig. 17: Final design of the custom abutment and crown.

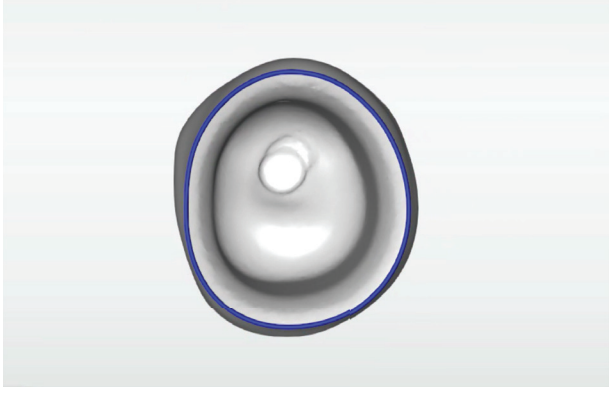

Fig. 18: Overmilling noted on intaglio of cement-retained crown.

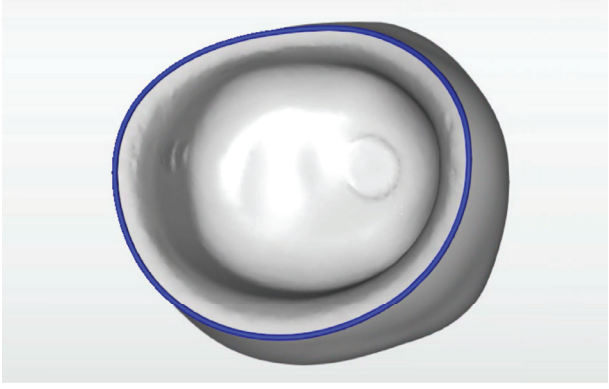

Fig. 19: Reduced overmilling after using the Form Smooth tool to polish the buccal "cusp" of the abutment.

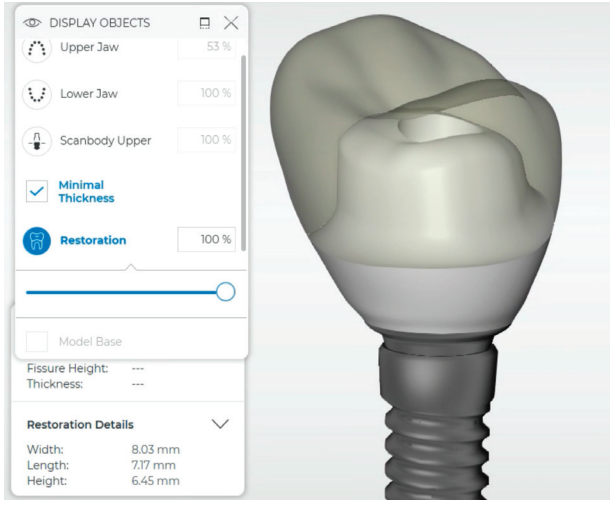

Fig. 20: Minimal Thickness activated to check for thin areas.

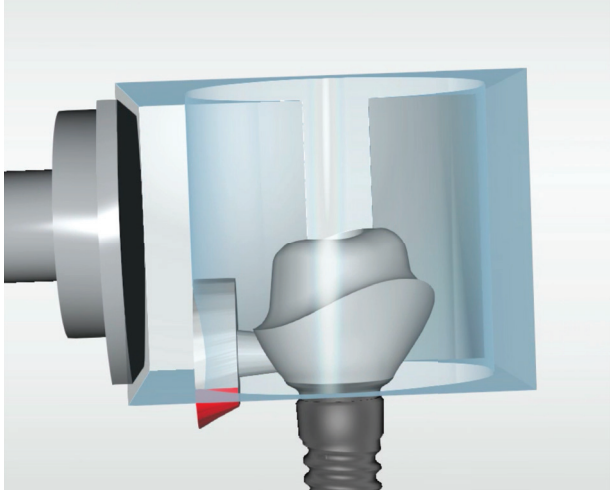

Fig. 21: Final milling path determined in the Manufacture Phase.

restoration for a better proposal. It's best to uncheck the "Constrained Adoption" button before moving back to Edit Restoration (Fig. 11).

The rest of the design process is quite simple. Treat the restoration like a normal crown. Design the clinical crown first using the FOCC techniques for Occlusion, Contours, and Contacts. I typically set my contact colors a little heavier than usual, so I have some room to adjust. It is much easier to remove material than to add it back (Fig. 12).

Once I have completed an ideal clinical crown design, I can then work on the emergence profile. My goal is to create a natural emergence that is not overcontoured but

Finally, there is a Smooth Out Whole feature that will perform a leveling to the entire margin, removing any sharp edges or transitions.

still closes embrasures and supports the tissue. I spend a lot of time making sure this initial "screw-retained" design is complete and as ideal as possible before I "split" the restoration into two components (Figs. 13 and 14).

If you remember, in the Model Phase I chose to use the Gingiva Mask. This controls my future split line of the abutment and the crown (Fig. 15). After you split, don't worry if your proposal is a little distorted, we can easily fix this (Fig. 16). In the restoration parameters, make sure you set your bottom layer parameters to have a shoulder width of 600 microns. This will adjust your abutment so it adds thickness all around. Now, simply use the Scale tool that is found after you split to adjust the abutment occlusally and radially. You can perform this function on the whole abutment or just a portion. Finally, there is a Smooth Out Whole feature that will perform a leveling to the entire margin, removing any sharp edges or transitions.

Once I have my final abutment design (Fig. 17), the last step I take is to smooth the occlusal surface of the abutment. I want to minimize any overmilling on the cement-retained crown so there are no issues with fit or rocking. By looking at the intaglio of the restoration (Fig. 18) you can see there is quite a bit of overmilling by the buccal "cusp." Using the Form Smooth tool, I can easily bring that down to minimize it (Fig. 19). The final step of the design is to turn on the Minimal Thickness button and check for any blue showing through (Fig. 20). The FDA has rules in place for minimal thickness and we cannot violate those parameters, it will not let us mill.

The final step is to manufacture the abutment (Fig. 21). Zirconia custom abutments are my preference for several reasons. Primarily, they are the least expensive implant material we have in our inventory. When delivering a large volume of these restorations, it can add up. However, that's not the primary benefit. In a recent study, de Oliveira and his group determined that zirconia and titanium were the most biocompatible abutment materials. The microbial profile and tissue health was found to be extremely favorable with those two materials (de Oliviera S, et al. *Clin Implant Dent Relat Res.* 2020 Feb 5). This is extremely promising as we are anxiously awaiting the upcoming availability of titanium milling with the new CEREC Primemill.

Although I prefer to use a cement-retained custom zirconia abutment whenever possible, there are sometimes space limitations that prohibit me from proceeding. Coupled with the taller TruAbutment TiBase, running out of material thickness can sometimes occur. Having backup solutions like Atlantis are helpful, knowing I don't always have to force a design with my TiBase if it is not the most ideal method.

I encourage you to look into more cement-retained abutment solutions. Because we can control the margin position, our risk for cement sepsis is extremely low. Coupled with the increased biocompatibility of zirconia and the variable collar heights of TruAbutment — this solution really is awesome.

For questions and additional information, Dr. Barsoum can be reached at mbarsoum@cdocs.com.

Laser Osteotomies Are Here Now

A Case Study that Demonstrates Successful Osteotomy and Subsequent Implant Placement Without the Need for a Drill or Scalpel

Heath B. Brantley, D.D.S.

Abstract

Lasers are quickly becoming an exciting new technology in dentistry, although they have been around for decades. Though their applications were limited in the beginning, there are many all-tissue lasers that promise to do anesthesia-free cavity preps, as well as simple soft-tissue surgery with no bleeding or stitches required. My practice has transitioned to using a laser for most routine dental procedures including hard-tissue and osseous surgeries. This case study demonstrates a 9.3 micron CO^2 laser's ability to cut a 10-mm deep osteotomy with subsequent implant placement.

Introduction

Dental technology is advancing at a breakneck pace. I'm completing my seventh year of clinical practice, and my workflows are radically different than when I started. When I graduated in 2013, I was woefully undertrained with regard to dental technology and how it improves clinical outcomes and, more importantly, patient experience.

CEREC® doctors perhaps better understand how rapidly the technological landscape is changing. In my short seven years of practice, I've cycled through the CEREC Bluecam, Omnicam, and now Primescan (Dentsply Sirona) — all of which were revolutionary technologies in their own right. Each year I think, "It can't get any better, can it?"

I've been treatment planning and placing implants following the CG2 workflow since the update came out in 2015 utilizing my Omnicam and ORTHOPHOS SL. Not much has changed in this regard over the last four to five years…until recently.

In a quest to push the limits of what is possible in my own hands and the profession at large, I challenged myself to take my implants to a different level. What if I said you can place an implant in an edentulous site (not extraction site) without prepping the osteotomy with a bur or drill? What if the osteotomy could be done with a laser instead? What would be the advantages and/or disadvantages?

I've been using the Solea All-Tissue Laser (Convergent Dental) for nearly three years and it has revolutionized how I approach simple procedures such as cavity preps, as well as larger surgeries like implant placement and tori removal. Lasers interact with the target tissue fundamentally differently than burs and scalpels. They are far less traumatic, and the inflammatory response is lessened.[1]

The Solea laser wavelength has been optimized for cutting the hardest tissue in the body — enamel — but is also efficient at ablating bone and gingiva. Aside from its unique wavelength (lasers are all about wavelength), the software controls how the laser beam pulses on the tissue through a process known as computer-optimized beam delivery. The current software allows for spot size to range from 0.25 mm to 1.25 mm in diameter because these sizes mimic our bur diameters used on teeth to remove caries.

There is an increasing body of research that supports using lasers to decontaminate implants,[2] treat periodontitis and snoring, perform crown removals, etc. Additionally, it has been shown that removing failed implants via lasers is preferable to trephining.[3] In my own practice, I've seen many advantages that my laser has over a bur. We have all seen what burs do to teeth when we are performing cuspal reduction for a crown procedure. The enamel splinters or fractures due to how aggressive the bur is. This does not occur with my CO^2 laser. The laser disinfects the tooth as it makes contact with the bacteria it is removing. I also find I am able to have extreme precision as it relates to caries removal because the settings can be governed by the computer and accidental pulp exposures no longer occur. Lasers are here to stay and their applications are seemingly limitless.

Case Study

I would like to present this case in which an implant was placed at site tooth #19 without the need for a scalpel or drill to perform the osteotomy. The procedure was performed

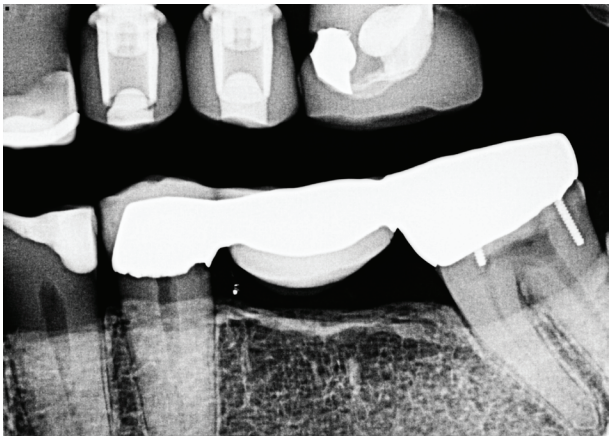

Fig. 1: Preoperative bitewing with caries on abutment teeth #18 and #20

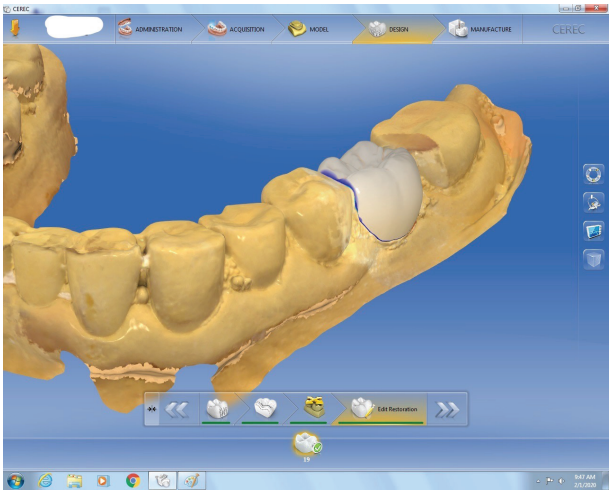

Fig. 2: Initial CEREC® scan following model surgery

using the Solea All-Tissue Laser, which demonstrates the ability to make both incisions and ablate bone.

This patient has been with me since I started clinical practice. There are two primary causes for the rampant root caries she has developed in her late 50s: 1) dry mouth; 2) gastric reflux. The patient has had an extensive history of restorative work and her posterior bridges have slowly developed decay on the posterior abutment teeth. The decision was made to extract those teeth and replace pontics with implant-supported crowns. The overall goal is to maintain a first molar occlusion and manage the caries process the best we can.

In early 2019, the patient was diagnosed with caries on teeth #18 and #20 (Fig. 1). The decision was made to extract #18, place an implant in site #19, and replace

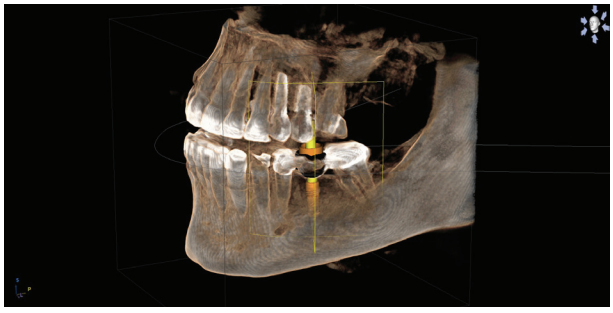

Fig. 3: Planning implant placement utilizing GALILEOS

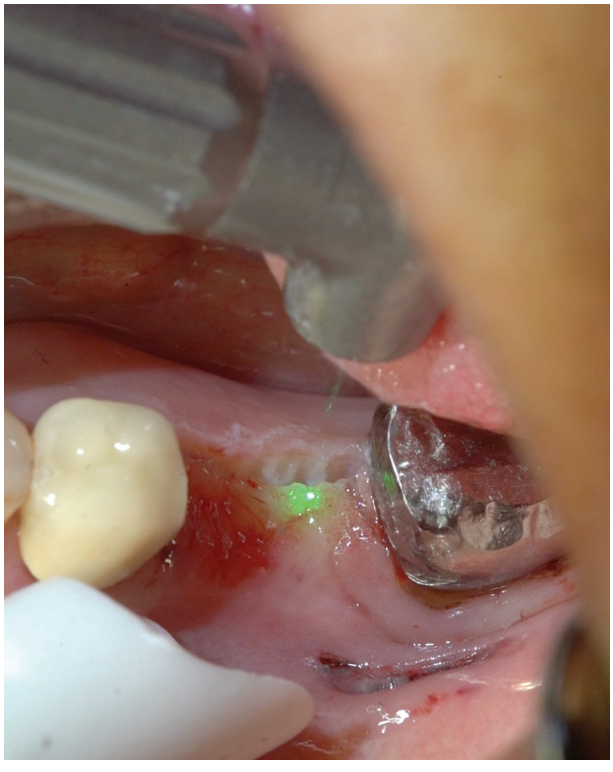

Fig. 4: Initial incision made by Solea All-Tissue Laser

crown #20. The patient had an existing stone model that we used to remove the pontic #19. A subsequent CEREC scan was done (Fig. 2) and a computed tomography image was taken to begin planning the implant. We decided to use tooth #18 as a posterior stop for the guide as this would dramatically improve the stability of the CG2.

The initial implant treatment plan utilized a Zimmer Trabecular Metal implant, size 4.1 mm x 11.5 mm (Fig. 3). I have been using these implants on patients with diabetes and patients with soft bone due to how rapidly the implants integrate.

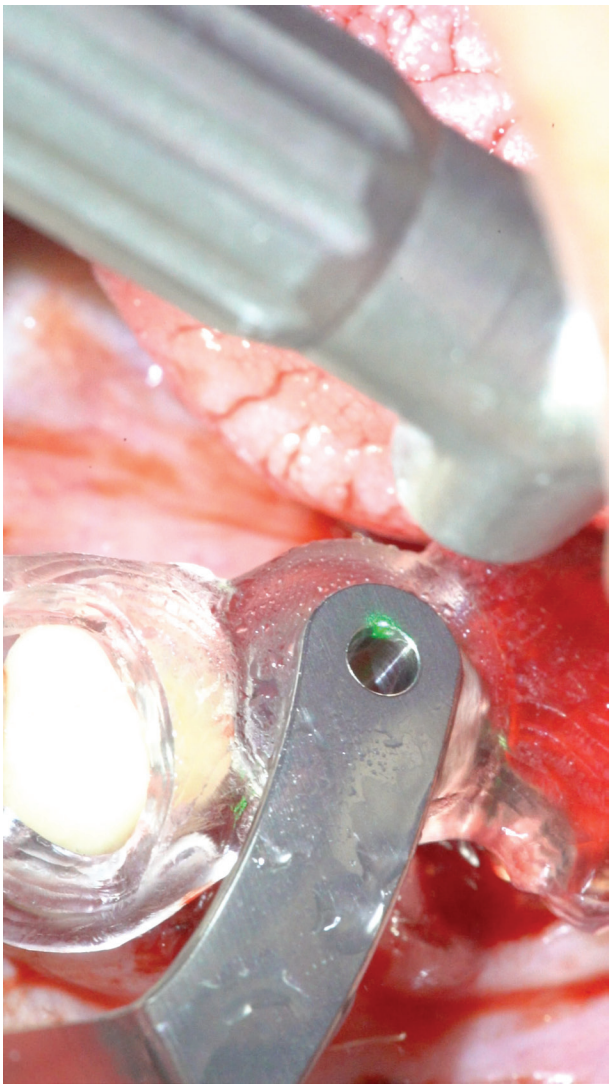

Fig. 5: Laser osteotomy initiated by directing laser through the CEREC® Guide 2

Fig. 6: Freehand ablation of bone to widen osteotomy apically

The goal of the surgery was to utilize the Solea All-Tissue Laser to perform the initial osteotomy (5–6 mm in depth), which is deeper than I routinely prep for implant surgeries. In the past 18 months, I've used Solea on all my implant surgeries to perform the soft-tissue punch and then decorticate the bone (1–2 mm in depth). This initial decortication is usually done through a 2-mm wide key placed in the guide and is limited to about 2 mm in depth before switching to my standard drilling protocol. I began by anesthetizing the patient via inferior alveolar nerve (IAN) and long buccal blocks. The failing bridge was then sectioned, being careful to maintain the integrity of the abutment crowns. A lingualized, crestal incision was made by the Solea laser between teeth #18 and #20, prior to elevating a full thickness flap (Fig. 4). The CEREC Guide 2 was then placed and a 2.3-mm key was inserted. The key is critical as it has a collimating effect on the beam and ensures that the angulation of the beam stays true. Additionally, the metal does not ablate directly, whereas a plastic guide would be destroyed if it came in contact with the laser. The laser was directed through the key (Fig. 5).

Every 30–60 seconds, the guide was removed and the osteotomy was assessed. The primary concern was not knowing the exact depth at which the laser had penetrated the bone. The keys were sequentially swapped until a size 3.8-mm key was placed. At a 6-mm depth, the guide was removed. The current software that controls the laser is designed so that the

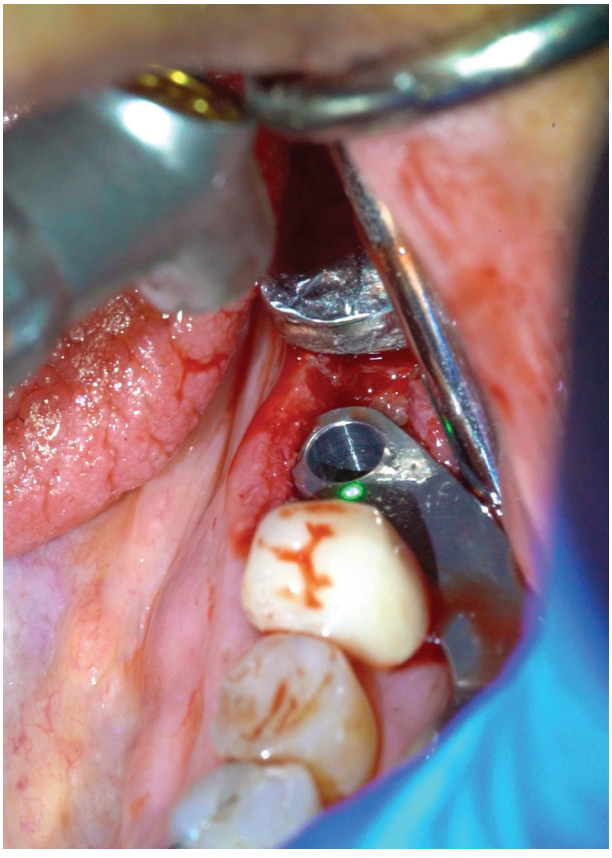

Fig. 7: Placement of key directly in osteotomy

handpiece should be changing angulations continually. In an osteotomy through a key, the angulation is straight down, perpendicular to the bone, and the angle does not change appreciably. This limitation leads to an osteotomy that tapers, resembling a V-shape due to the overlap of the individual laser beam within the selected spot size. The resulting osteotomy is wide at the top and narrow at the bottom. This challenge necessitated free-handing parts of the osteotomy by angling outwardly (Fig. 6). Once the osteotomy was roughly the same diameter at the crestal aspect as at the base of the 6-mm osteotomy, the key (Fig. 7) was inserted directly into the osteotomy in an attempt to demonstrate the uniform width of the osteotomy and depth that had been achieved. The osteotomy was then continued with the 3.8 key (total outer width is 5.2 mm) placed in the bone until a depth of 10 mm was achieved.

The osteotomy was completed in approximately 10 minutes, at which point the dimensions of the

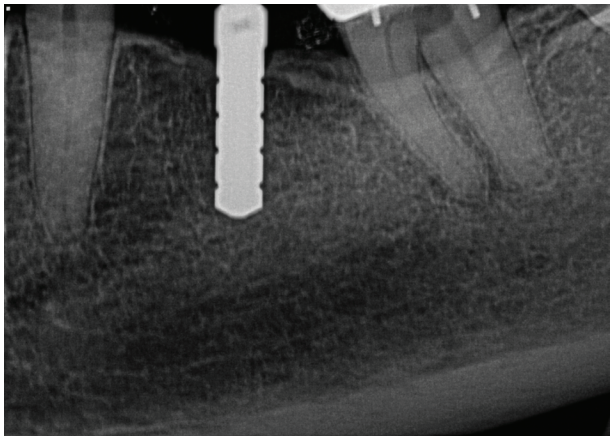

Fig. 8: Guide pin placed to demonstrate uniform width and 10-mm depth of osteotomy

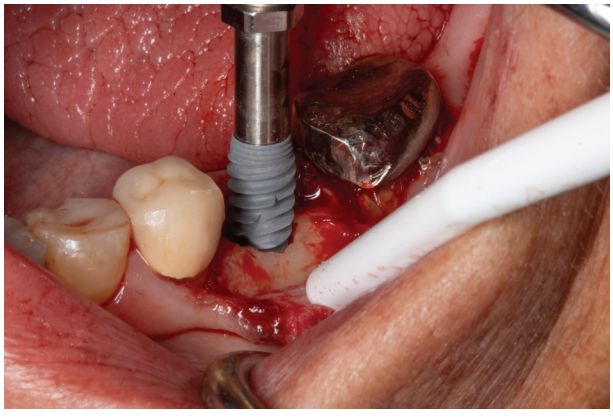

Fig. 9: Driving the Nobel Active implant into the osteotomy

osteotomy measured roughly 3.8-mm wide and 10-mm deep (Fig. 8). At this point in the surgery, a decision was made to attempt to place an implant into this drill-less osteotomy prep. The original plan was to place a Zimmer trabecular metal implant, but it is not self-tapping and is more of a press fit. We did not trust that our osteotomy was sufficiently prepped to accommodate this implant, so we decided to substitute a Nobel Active 5.0 x 10 mm (Nobel Biocare). We were confident that the 10-mm depth had been achieved. The Nobel Active implant is tapered, self-tapping, and could be driven into this osteotomy. The implant was torqued in at greater than 35 NcM (Fig. 9). A radiograph was taken to confirm the final implant position. A cover screw was placed and primary closure achieved with chromic gut sutures. Follow up was done at the 1-month mark.

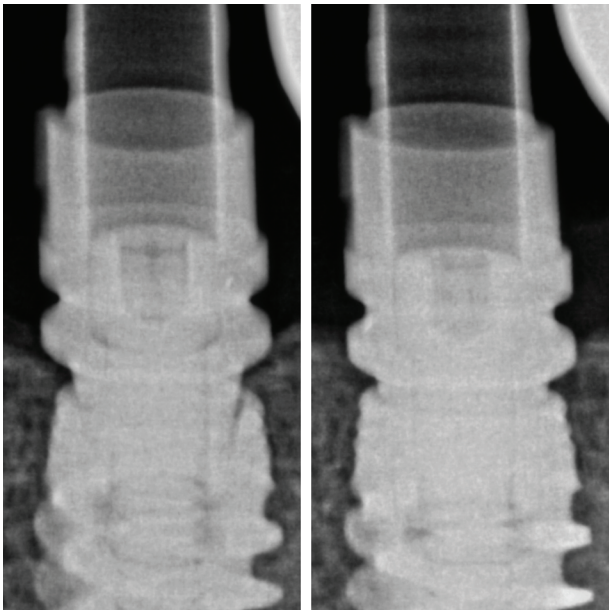

Fig. 10: Incomplete seating of ScanPost prior to bone profiling with the laser

At 4 months healing, the implant was uncovered and the implant was checked for stability. We placed a Dentsply Sirona ScanPost and determined radiographically that it was not seated. We then profiled the bone with the Solea laser to allow for complete seating (Fig. 10). A custom healing abutment was placed and the patient was instructed to return in a few days for final crown placement. The abutment crown was fabricated utilizing the CEREC implant workflow and the screw-retained crown was placed. The patient was then instructed to return for a postoperative visit in two months (Figs. 11 and 12).

Discussion and Practicality

Some might object to preparing an osteotomy using a laser ("just because you can doesn't mean you should") or that our current accepted implant protocol using a sequence of drills works well and does not merit change. Currently, at our practice, we use the Solea laser to complete most of our fillings, which has represented a huge paradigm shift in our practice of dentistry. If a hard-tissue laser can successfully replace the traditional handpiece and bur, is it not reasonable to consider that it also can replace the implant motor, handpiece, and drill? That was our thought process, at least. And since we already owned the Solea laser, the answer to "Is a laser osteotomy practical?" was an easy YES.

Fig. 11: Two-month postoperative photo

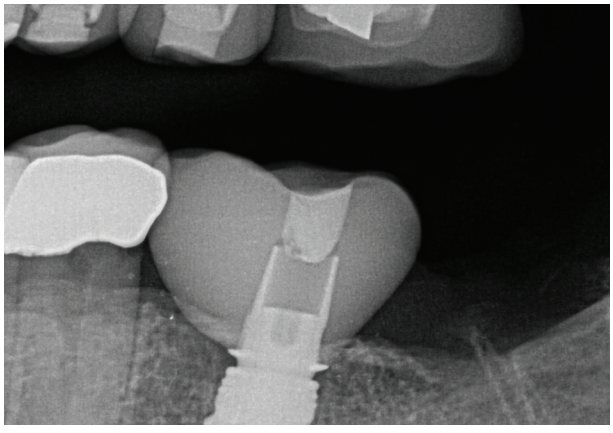

Fig. 12: Two-month postoperative bitewing

As hard-tissue lasers gain more market share in dentistry, we think they'll increasingly replace some of our older, more traditional instruments and techniques. That said, we are undoubtedly in the early days of hard-tissue lasers. Accordingly, the research and development as well as protocols and techniques for these lasers are advancing. With this development and user adoption, techniques like a laser osteotomy will become easier, more predictable, and ultimately much more practical — especially for the practitioner who already owns a hard-tissue laser that they use for many other procedures.

The burning questions surrounding laser osteotomies are: 1) Does the laser potentially create a better osteotomy? and 2) What are the concerns with using a laser to create an osteotomy?

A Better Osteotomy?

With our case study, we don't have data to support a claim that a laser osteotomy is a better one. However, there are guidelines for what defines a good osteotomy. Does the laser pass the following osteotomy tests? A good osteotomy protocol should:

1. be precise and accurate in its intended location
2. be predictable and repeatable across cases
3. be relatively easy to perform by the practitioner
4. be relatively comfortable for the patient
5. have few limiting factors (such as anatomical or patient maximum opening)
6. promote proper implant integration and overall healing.

In the case presented here, requirement numbers 3–6 were adequately satisfied. Requirements 1 (precision and accuracy) and 2 (predictable and repeatable) cannot be fully concluded due to the novelty of the procedure. The precision and accuracy of the final implant placement was less than that which we experience when performing a fully guided implant surgery but about equal to that of a free-handed implant placement.

Considering this was, to our knowledge, the first time a full implant laser osteotomy with subsequent implant placement was attempted on a live patient, we were quite satisfied that the procedure passed the majority of tests for a good osteotomy. Furthermore, if the laser manufacturer and others help build out the laser osteotomy protocol, precision, accuracy, predictability, and repeatability would likely dramatically improve.

Potential Advantages of Laser Osteotomies

In addition to the general benefits of lasers in dentistry already discussed, laser osteotomies aspire to solve other issues and provide other benefits to implant surgeons. They may include:

1. reducing the physical challenge of inserting long drills in posterior regions, especially for patients with limited opening
2. cost savings due to reduced "drilling" armamentarium
3. multipurpose use of laser to reduce the need for other equipment or instruments
4. laser light does not deviate or deflect when it comes in contact with a socket wall or sloped ridge.

Potential Concerns of Laser Osteotomies

In our own experience and in limited discussions with other practitioners, most concerns regarding a laser osteotomy fall into one of the following categories:

1. overheating bone
2. general bone healing and implant integration
3. angulation control
4. depth control
5. loss of tactile sense.

Fortunately, a literature review revealed considerable prior investigation into the topic of laser osteotomies[4] and specifically some of the above concerns.

Overheating of bone: Eyrich et al.[5] demonstrated that a 9.6 um CO^2 laser (quite similar to the Solea laser) actually causes less temperature increase in porcine osteotomies than both conventional drill sequence osteotomies and Er:YAG laser osteotomies. In a rare human model laser osteotomy paper, Stubingner et al.[6] concluded there was no laser-related thermal damage to bone and that laser osteotomies are practical in oral surgeries. Numerous other studies[1] supported the claim that thermal damage during laser osteotomies was not a concern.

Bone healing and implant integration: In 1999, Montasser et al.[7] showed that osseointegration of titanium screws in rats could be achieved following Er:YAG laser osteotomy. That study was confirmed in a future study with rabbits. Other animal model studies[1] have demonstrated similar healing processes and osseointegration success when comparing laser osteotomies to traditional drill osteotomies. Some studies even demonstrated that compared to traditional osteotomies, laser osteotomies yielded better bone formation, as well as improved bone healing.[4]

Angulation and depth control: Admittedly, with our patient's laser osteotomy, angulation and depth control were perhaps the two most challenging variables of the procedure. Depth control was addressed by a start-stop technique of alternating using the laser and then measuring depth. Stubinger et al.[6] concluded that there is no depth control with laser osteotomies. Angulation control was managed by a combination of surgical guide initial use followed by a start-stop technique alternating using the laser and then checking angulation. Seymen et al.[8] did conclude, however, that angulation control

could be accomplished using an SLA stent. We believe that future innovation could dramatically improve both angulation and depth control during laser osteotomies.

Loss of tactile sense: CO^2 lasers, like the Solea All-Tissue laser, are noncontact surgical instruments, and thus the very "natural" and often comforting tactile sense is lost. Talk to enough experienced implant surgeons and you'll hear them discuss their ability to feel their way through bone, claiming to be able to distinguish, for example, cortical plates from softer, cancellous bone. There's no easy answer to this concern for lasers. Tactile sense will likely be replaced by both a dependence on reliably accurate technology and for the skeptical, a start-stop technique to ensure the osteotomy is not perforating a cortical plate. With current fully guided implant surgeries a lot of tactile sense gets lost in the extra hardware, thus making the jump to a tactile-less laser osteotomy a little more manageable for some.

Future Steps and Recommendations

Currently, the Solea laser's software maximizes speed of tooth ablation and comfort and has a maximum spot size of 1.25 mm. To address the reproducibility, angulation and V-shaped tapered osteotomy concerns, a software patch that allows for spot sizes of 2.0–5.0 mm (to mimic implant drills) would allow for the beam to be spread out more uniformly with less overlap and resulting in a more uniform width of the osteotomy. This would dramatically reduce the need to freehand. Additionally, a specialized handpiece or metal tip with varying diameters could be manufactured to coincide with the larger spot sizes to regain part of the tactile sense that is lost when using lasers. There is a periodontal tip that has this same effect. It has markings for measurements and allows the practitioner to sound the bone prior to firing the laser. The metal tip or attachment would correspond with the diameter of the keys or surgical guide, further improving the accuracy and reproducibility of laser osteotomies.

Conclusion

While a seemingly novel approach, laser osteotomies date as far back as 1999 in the literature.[6] The case study we present here is, to our knowledge, the first known fully laser osteotomy on a live patient with subsequent implant placement. Successful implant integration and restoration of the implant provides a proof of concept that lasers are formidable surgical instruments when compared to traditional instruments and protocols. Additionally, substantial research over the past couple decades has provided good evidence that laser osteotomies do not cause thermal damage to bone or inhibit implant osseointegration. Angulation, depth control, and a loss of tactile sense are recognized hurdles for laser osteotomies. In our opinions, they represent solvable challenges, especially as laser technologies continue to evolve as they gain both market share and popularity as multipurpose, precise, and biologically friendly dental instruments.

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Lessons

Sameer Puri, D.D.S.

I think this is the most difficult Happenings article I have had to write in the 12-year history of this publication. My hope is that this article will be extremely prophetic with all that the world has endured in this difficult time in our rear-view mirror. Otherwise, I and others will have greatly misjudged a once-in-a-lifetime pandemic. If the latter has happened, God help us all.

As of this writing, California and Pennsylvania, among others have all instituted a statewide shutdown of nonessential services. Dental board after dental board is recommending the shuttering of offices and recommending emergency care only for patients for the next few weeks. All elective dental procedures are to be postponed. Offices are devastated because any federal relief does not include or put dentistry in high consideration.

Yet, here we are, a few months after the fact and slowly things are becoming normal again, or the new normal would be a better way to describe it. Hygiene schedules are filling up again. All of the patients who had elective work that was postponed have an urgency to reschedule. Offices are busy once again. The pent-up demand is a welcome sign. The shutdown, however, took its toll. Smaller staff, lower production, leaner operations. There was definite carnage left in the wake of the virus.

In hindsight, going through what we went through was difficult. Layoffs, bankruptcies, unemployment, a devastated economy. The eternal optimist in me that always tries to look for any sliver of a silver lining in any event says maybe this was a good reset, a chance to look deep inside our collective souls and realize that maybe, just maybe, it is time to prioritize what really matters in our lives.

The excesses of one of the greatest bull runs in the history of our country was not without its own set of problems. Easy money and cash flow and a booming stock market allowed us to get a little fat and lazy. The car payments that could have been better spent toward saving for retirement, expensive vacations that perhaps could have been done more inexpensively, luxuries that maybe we didn't need that were needlessly financed at the expense of saving and putting funds away for a rainy day.

And now, as we come out on the tail end of the great virus pandemic, this is the time where we have the opportunity to not just wax nostalgic over what could have been and what we should have done, but the opportunity to take legitimate actions into making a more secure tomorrow for us and our families and prepare for the next downturn.

Don't just say you will focus more on work, do it. Don't just say that you will save more for the next rainy day, do it. Don't say that you will prioritize your family over all else, do it. Don't say you will invest in your education, do it. At the end of the day, while this event was unprecedented, so was the economic meltdown of 2008, and the dot-com crash in the 2000s. We recovered from those and I am optimistic that the seeds of recovery have been planted from this downturn. You can bet your bottom dollar that there will be another life-altering event in the future. It's not a matter of if, but when. My sincere hope is that we all learn a lesson from this so that we are better prepared the next time the world decides to get sick.

For questions and additional information, Dr. Puri can be reached at spuri@cdocs.com.

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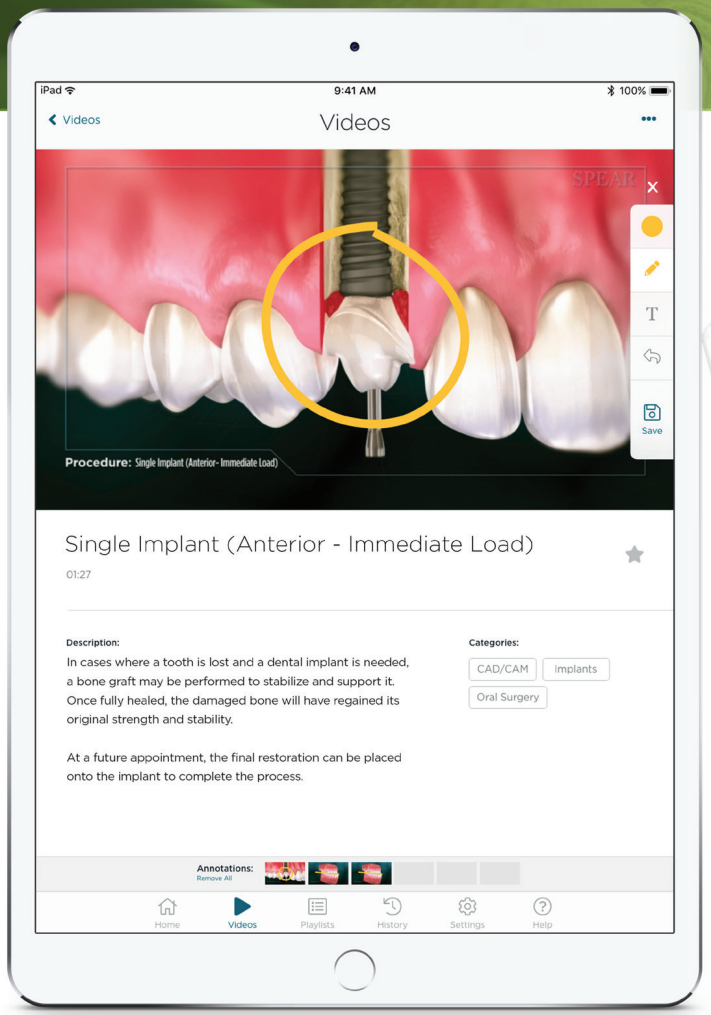

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