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**CEREC® AND 3-D PRINTERS:
IT'S TIME TO OWN BOTH**

Discussion Forum

The Forgotten One: The CEREC® Inlay

Treatment With Nanohybrid Ceramic Blocks in a Single Appointment



ONE OF THE GREATEST RESTORATIVE OPTIONS AVAILABLE WITH CEREC IS OFTEN OVERLOOKED AND FORGOTTEN: THE CEREC inlay. Advances in material technology available, combined with an ability to mill ceramic inlay restorations chairside, affords the opportunity to provide a more predictable, more conservative and more esthetic restoration for our patients.

In the past, there were issues with both the materials and methods available for fabrication of ceramic indirect Class II/Class III posterior inlay restorations. Years ago, when the analog method was necessary, fabricating a Class II/Class III posterior ceramic inlay was inconvenient. It required a second visit and was very challenging to provisionalize. In addition, feldspathic ceramics used for the lab analog fabrication process were brittle and often fractured during service.

Those problems now have been resolved with the advent of nanohybrid ceramic blocks and the ability to mill these restorations chairside in a single appointment. Nanohybrid blocks combine the best characteristics of high-strength ceramics and composites. Many of these restorations are in service — and with significantly fewer fractures recorded compared to earlier materials. According to Dr. Gordon Christensen, the physical properties of the ceramic and polymer blocks used for milling indirect inlay restorations have been proven to be better than those materials used in dental labs. The reason is the manufacturer fabricates the blocks in highly controlled environments.

Indirect Class II and Class III CEREC inlay restorations provide a predictable solution to restore larger preparations that otherwise present numerous challenges to complete using direct composite resins. Replacing a large failing Class II or Class III amalgam with a direct composite presents itself with multiple obstacles. Larger direct composites are difficult to isolate, time consuming to place, can introduce dreaded voids into the restorations and present challenges to creating ideal broad contacts.

In the author's opinion, there is nothing more frustrating than spending significant time and attention placing a direct composite resin restoration, only to remove the matrix band and find a "point" or light contact.

The author advocates using direct composites for small Class II lesions on virgin teeth, where a conservative "slot" prep can be used. However, if after excavation of caries and removal of any previous

restorations, the preparation is such that the isthmus of the preparation is greater than one-half the buccal-lingual width, the box preparation extends into the buccal and lingual line angles, or if the box extends subgingival, a CEREC inlay is the preferred restoration.

After utilizing various blocks available, the author prefers using CERASMART nanohybrid ceramic blocks for the fabrication of inlay restorations. This block is one of the blocks available in the class of materials known as "nanohybrid" ceramic blocks

CERASMART is known for being a flexible, force-absorbing material due to the homogenous distribution of the nano ceramic matrix when compared to other materials in its class. It mills quickly without chipping, and does not require time in the oven for sintering or crystallization. Once bonded into the tooth, the margins blend seamlessly with the surrounding tooth structure. It has high radiopacity and is wear resistant. Other advantages include the ability to stain and glaze with OPTIGLAZE Color for more individualized customization. Lastly, it has the ability to be repaired in the mouth if needed with G-aenial Universal Flo flowable composite resin, that shares the same nanotechnology. However, it is worth mentioning that the author has not had a case where a repair was warranted.

There are some technical challenges of the CEREC inlay restoration. The key to fabricating well-fitting, successful CEREC inlays is no different to that of any other type of CEREC restoration: it all comes down to the preparation.

Time and attention must be paid to the design and execution of the preparation. Guidelines for the CEREC inlay preparation while using the Omnicam are as follows. The preparation must have draw with no undercuts, especially in the interproximal box. The floor of the preparation should be flat, the internal line angles rounded and smooth. Occlusal margins should not coincide with occlusal contacts, and it should have straight exit walls on the interproximal. Also, care should be taken to avoid leaving preparation margins on centric occlusal stops.

CASE REPORT

A 45-year-old, healthy male presented for initial exam with a large failing occlusal amalgam on tooth #14 (Fig. 1). Also noted were multiple cracks on the distal marginal ridge, with shadowing at the marginal ridge and distal lingual cusp. An intraoral image illustrating the condition of the tooth was taken for both patient education and submission for preauthorization from the patient's insurance company. The patient was advised of the findings and agreed to proceed with restoring his tooth with a CEREC inlay restoration.

A local anesthetic was administered via The Wand to locally infiltrate buccal to tooth #14. An Isolite mouthpiece was placed to achieve isolation for the preparation. The failing amalgam was removed using a pear-shaped course diamond bur in a highspeed handpiece. The cracks were removed, and a proximal box was prepared using a course diamond bur.

Enamel chisels DM1 & DM2 were used to plane both the floor and the exit walls of the proximal box. A caries indicator was used to confirm all recurrent caries were removed. The preparation was scrubbed with 4 percent pure chlorohexidine. The floor of the preparation was lined using flowable composite resin to establish a smooth pulpal floor (Fig. 2). Once rinsed and dried with an air/water syringe, the preparation quadrant, opposing and buccal bite catalogs were scanned with the CEREC Omnicam.

The CEREC Omnicam created a virtual image of the quadrant in the CEREC software from the digital information captured. Margins on the virtual preparation were initially created using auto margin finder, and then corrected as needed in the proximal exit margins using the manual mode (Fig. 3). The design proposal was reviewed and the proximal contact set. The sprue was positioned on the contact area.

The restoration was then milled using a CERASMART A2 HT block. Once milled, a pencil was used to outline the border of the sprue (Fig. 4). The pencil mark served as a guide while the sprue was carefully removed with a high-speed handpiece, and a fine-grit diamond, flame-shaped bur.

The Isolite mouthpiece was reinserted intraorally into the patient's mouth. A disposable adhesive applicator was used to securely hold and place the restoration during the try-in, and affixed to the occlusal surface of the inlay. The restoration was then trial seated to verify the margins were closed, and the contact was checked with floss. A nice broad contact was confirmed (Figs. 5-6).

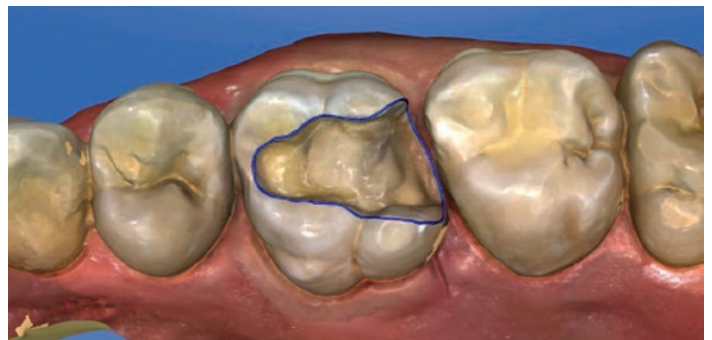
The restoration surfaces were then microetched extraorally with Aluminum oxide, 50 micron, white abrasive to prepare the restoration for staining and glazing (Fig. 7). The restoration was then steam cleaned and air dried with an air syringe.



*Fig. 1 (above):
Leaking, defective,
large failing
amalgam
restoration with
cracks present
on distal
marginal ridge*



*Fig. 2 (above): Finished preparation with
round and smooth internal line angles
and path of draw*



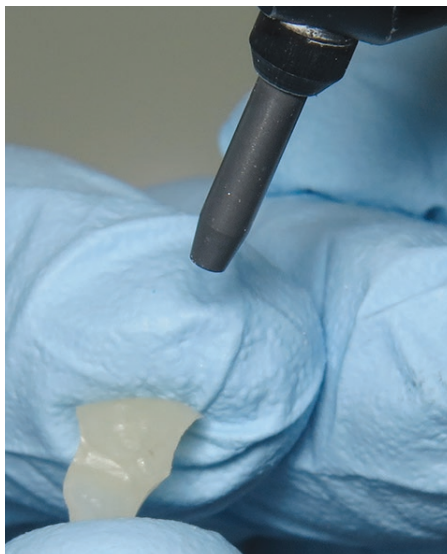
*Fig. 3 (above): Preliminary margins
using auto margin finder*



*Fig. 4 (left): Milled inlay restoration
with pencil outline to aid in
sprue removal*

Fig. 5 (right): Removal of the inlay after try-in facilitated with Stick-n-Place disposable adhesive applicator

Fig. 6 (far right): Restoration try-in accomplished using a disposable adhesive applicator



The restoration was then characterized using red-brown stain in the occlusal fissures, and white stain to highlight the lobes (Fig. 8). The stains were applied with a very fine-tip porcelain brush. Optiglaze requires an LED light cure with output in the 405nm range in addition to 468nm. Stain applications were light cured for 40 seconds each on the high setting. A clear coat of glaze was then applied with another porcelain brush and light cured for an additional 40 seconds (Fig. 9).

Once the staining and glazing process was complete, the restoration was prepared for bonding. The restoration's intaglio surface was previously microetched with Alumina Oxide, 50 micron, white. Next, it was treated with a silane coupling agent and air-dried with an air/water syringe after 30 seconds (Fig. 10).

The Isolite mouthpiece was reinserted and tooth #14 was prepared for bonding. The prep was rinsed and air-dried. The enamel was selectively etched with 35 percent phosphoric acid gel for 20 seconds (Fig. 11).

Fig. 7 (above left): CERASMART Inlay restoration micro-etched with aluminum oxide using the Danville Microetcher

Fig. 8 (above middle): CERASMART Inlay restoration after staining with red-brown OPTIGLAZE color in the occlusal fossa

Fig. 9 (inset): CERASMART Inlay restoration after application of white stain on the lobes

Fig. 10 (above right): Application of G-Multi PRIMER to the intaglio surface of the restoration with a microbrush

Using G-Premio BOND™ and G-CEM LinkForce allows for a minimum cement space. G- Premio BOND and G-Premio BOND Dual Cure Activator were mixed in a well in a 1:1 ratio (as per the manufacturer's provided technique guide) to allow for the resin cement to be a dual-cure (Fig. 12). The mixture was then applied to the preparation using a microbrush for 20 seconds and then air-dried with maximum pressure for five seconds.



Fig. 11 (above left): Selective enamel etchant

Fig. 12 (above right): G-CEM LinkForce resin cement system and completed inlay

Fig. 13 (far left): Occlusal view of CERASMART inlay after bonding with G-CEM LinkForce

Fig. 14 (left): Buccal view of CERASMART inlay after bonding with G-CEM LinkForce cement

G-CEM LinkForce cement was then dispensed into a “tube and plug,” and loaded into a composite gun, which was used to dispense the cement to fill the preparation two-thirds of the occlusal height. The restoration was seated using the stik-n-place disposable adhesive applicator. Once seated, the restoration was tack-cured for two seconds, and the excess bulk cement easily removed with an explorer. The contacts were flossed using a piece of floss with a small knot tied into it to aid in cement clean up.

Once the majority of excess cement was retrieved, glycerin gel was applied to the margins of the restoration to prevent an oxygen-inhibited layer. The final cure was then performed with the curing light on a high setting for an additional 40 seconds. The occlusion was then checked with articulating paper and adjusted with finishing burs.

The end result was a strong, durable, conservative restoration that blends seamlessly into the surrounding tooth structure while conserving and strengthening the remaining unaffected tooth (Figs. 13-14).

CONCLUSION

This clinical case demonstrates the life-like and seamless appearance that can be accomplished with a nano-ceramic material without the need for firing the restoration in a porcelain furnace.

The next time a large MO, DO or MOD preparation is glaring back at you, before reaching for your matrix band, consider the better alternative: the indirect inlay.

Take advantage of the amazing technology we now have at our fingertips with CEREC and CERASMART. Simply scan, design, mill, glaze chairside and bond. Say farewell to annoying point contacts and composite voids. The CEREC inlay provides the opportunity to predictably and efficiently restore our large, Class II and Class III preparations with a stronger and more esthetic solution. ■

For questions and more information, Dr. Halpern can be reached at kmhalpern@mac.com.