Bar and counterbar system with composite veneering illustrates interaction of analog and digital dentistry

By Giuliano Bonato, Dental lab owner, Italy

At times, dentists send my dental lab a prototype (a copy of the provisional item tested in the patient's mouth), asking us to finalize it and make a definitive product. It is interesting in such cases to see how manual finishing skills intersect and integrate with advanced digital tools and machines — confirming that the “mouse operator” also needs a solid background as a “dental technician.”

Early concerns that machines would ultimately deprive dental technicians of their central role have given way to acknowledgement that the dental technician’s hand is essential, especially in complex work requiring precision and customizing — at least for the immediate foreseeable future. Only a dental technician’s mind can easily switch between digital and manual tasks to produce — with the dentist — high-quality products suited to the final and primary goal: preservation of the patient’s oral health.

The following case highlights this interaction between manual work and now-essential CAD/CAM systems. The case is not unusual: Lab assistance was requested of us after implant of a provisional prosthesis that was made by another laboratory. The request was for a final prosthesis with a primary bar in titanium, screwed onto implants, and a counterbar, also in titanium, with retention clips. The specialist requested composite veneering material.

After a master model was developed, we then improved proportional aspects, alignment of the teeth and esthetics of the product wherever possible. Everything was “recorded” via a silicone mask, packed inside a verticulator system (Fig. 1). This “recording” enables us to store, with accuracy and repeatability, the shape and volume of the product. Through the mask on the verticulator, we mold an acrylic (or composite for a provisional item) duplicate on the model. In the latter case, the milling enables discarding of the necessary amount of volume, creating the right design for a suitable support for future veneering with a composite esthetic material.

The resulting prototype was sent to the milling center to be scanned — and using an innovative technique — “virtually divided” into a primary bar and a counterbar, adding retention clips in a single file (Fig. 2). This ability with CAD/CAM to design, produce and mill the two units at the same time, on the same titanium disc, achieves excellent coupling precision.
The initial virtual design, displayed with a 3-D program, enables the technician to analyze and make note of crucial aspects arising from CAD modeling. Everyone communicates remotely and simultaneously, with the same images on everyone’s monitors, enabling careful configuration of the structure’s design. With this case, adjustments were made to the volume and extent of future pink flanges of the prosthetic body and optimized, by advantageously varying the position, the retention clips (ball-attachment), embedding them in adequate volume areas within the counterbar.

To prepare the device for the practice’s functional and esthetic testing, the portion of prosthetic body was partially reduced in thickness using the micromotor, and pink wax was added. Testing also enables the patient to clearly see the boundary between the pink gum and the arch of the teeth (Fig. 3). The dentist/specialist checks accuracy of fit, articulation with the antagonist and functionality of eccentric movements.

For the transformation of the esthetics, we use a joint casing in the mold with a silicone base sufficient to place the counterbar. Simple steel wire sections (for hooks) with a diameter of 0.9/1.0 mm applied on the model act as channels for injecting the composite. With this case, once the base silicone mold was isolated and the joint casing lid closed, we were ready to cast the transparent silicone (22 shore hardness). Polymerization of this takes place under pressure (4/6 bar) for 30 minutes (Figs. 4, 5).

The counter die, separate from the base, was put aside, and we used the micromotor for milling, preparing the cut of the enamel on the model. The aim was to create sufficient space to be able to insert the characterization between dentin and enamel, with effects and contrasts to highlight transparencies, color and mamelons. Using a second cover (having prepared the injection channels again), we proceeded as in the previous phase to the casting of the transparent silicone.

This technique provides obvious advantages. First, we will be able to use the initial prototype/model in every way, thus avoiding repeating any phases. The material reduction for the enamel cut, carried out with the micromotor, reduces risk of hitting the metal in the structure. With practice, it’s possible to correctly calibrate the volume between dentin and enamel, for inserting the color effects. Going back to the practical phases, we can now free the armor and treat the trial by sandblasting (Al2O3), silicification, salinization and laying of the opaque, curing and self-curing (Figs. 6–8).

A first application of colored dentine, with joint casing open, created more depth in the holes of diatomic teeth and in interproximal areas. To intensify the color of the canines, we applied a type of “shell” with a more intense color mass so that the dentin, once thinly injected, reveals a color with a more pronounced tone.

Everything was pre-polymerized through a “quick” device to proceed to closing the joint casing. The spout of the syringe was inserted, then starting from one of the more distal injection channels, we extruded the material. Because of the transparency of the counter die, we were able to confirm complete filling of the space with the dentin mass. If necessary, we can use the other channels by progressively moving the syringe into the other holes (Figs. 9, 10). The joint casing, being filled in this way, must be kept in the dark for 10 minutes before proceeding with curing, enabling release of any small excess of injected material (Fig. 11). Being able to accurately calibrate the exact amount of material needed to fill the cavity reduces waste.

Once curing was complete (a few minutes is enough), we separated the counter die and, without touching the dentin, cut the injection channels with a scalpel. This characterization phase, with the creation of contrasts by inserting colored and transparent masses, is typically considered the most creative part of the transformation process (Fig. 12).

Keeping the surface “dispersion phase” of the pre-polymerized composite intact maximizes adherence of the characterization and the enamel injected in the counter die (with the complete anatomy of the arch). Again, with the joint casing closed, the transparency enables identification of spaces that need to be filled by injecting enamel through the provided injection channels (similar to Figs. 9–11). As previously noted, it is good practice to let the joint casing “rest” in the dark for 10 minutes to let any excess injected material flow from the channels.

Pre-polymerization takes about one minute with the cover. Once removed from the mold, the product is again exposed to light as recommended by the manufacturer’s instructions (Figs. 13–15).

Accuracy of the materials used, combined with the described transformation system, does not allow chewing mounts to be inserted. The more accurate the modeling phase, the quicker the finishing times.

To coat the gum portion, we first treated the metal and, to also identify the pink prosthetic body, applied a paste composite by hand (Figs. 16, 17).

The product (Figs. 18, 19) still deserved a few considerations.

For the retention system used between the bar and the counterbar, we took advantage of the accuracy and versatility of the CAD/CAM systems and decided to used a modern interpretation of a “simple ball attachment.” Starting from the principle that the nylon retention cap can be replaced at

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INDUSTRY NEWS

For the first time anywhere, Designs for Vision is introducing the Micro 3.5ef Scopes at CDA Presents, April 30–May 2 in Anaheim. The Micro 3.5ef Scopes has a revolutionary optical design that reduces the size of the prismatic telescope by 50 percent and reduces the weight by 40 percent while providing an expanded-field, full-oral-cavity view at 3.5x magnification.

“We listened to dentists who wanted the field of view of an expanded-field 3.5x telescope, but were concerned about wearing them all day because of the size and weight,” said Designs for Vision President Richard Feinbloom. “Designs for Vision was started by my father, Dr. William Feinbloom, as an optical company in 1961 to design innovative head-borne optical devices, and the new Micro 3.5ef Scopes continues that tradition of optical innovation. The California Dental Association meeting has always provided a great place to showcase new technology, and we are pleased to be debuting the Micro 3.5ef Scopes at CDA along with our other new products.”

Feinbloom said the company always looks to showcase new products at CDA, and this year introductions also include the NanoCamHD™ loup-mounted video camera and two new frames: Nike® Retro and DVI Sport frames.

NanoCamHD records digitally at 1080p high-definition resolution

“This is a unique opportunity to reach an important target market to introduce a major electro-optical innovation,” Feinbloom said. Designs for Vision’s new NanoCamHD records digitally at 1080p high-definition resolution. The NanoCamHD records magnified HD images from the user’s perspective. The complete system includes 2.5x, 3.5x and 4.5x lens systems to match the magnification you are using, providing a true user’s point of view.

As an added feature, still photographs can be taken from live video feed or during playback mode. The video or still images can be uploaded into a patient file, included in a presentation or course, or shared with a colleague or laboratory for collaborative consultations.

Headlight and foot-pedal controls

The NanoCamHD complete system includes a color-corrected ULTRA Mini LED DayLite® headlight. The combination headlight/NanoCamHD can be attached to loupes or worn on a lightweight headband.

The system also includes a foot pedal to enable hands-free operation of the NanoCamHD. Record/pause, mute/unmute and still photography are controlled by the operator hands-free via the foot pedal. For best results, combine the NanoCamHD with Designs for Vision’s dental telescopes — matching true magnification levels of 2.5x, 3.5x or 4.5x, which produce the most realistic simulation from the user’s perspective.

Two new frames

The new Nike Retro frames, exclusive to Designs for Vision, are available in tortoise shell, black and translucent gray. The company describes the Nike Retro as having a classic look and excellent function. The DVI Sport frames can be used for all magnifications and can incorporate eyeglass prescriptions, providing the protective wrap without any distortion. The NanoCamHD can be attached to the new Nike Retro or DVI Sport frames.

Feinbloom invites attendees at the 2015 CDA Presents meeting in Anaheim to visit the Designs for Vision booths in the exhibit hall, Nos. 846 and 1204, to “See the Visible Difference” themselves.

(Source: Designs for Vision)
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Extraction Academy teaches clinicians to safely, effectively and confidently perform extractions

One-day, hands-on workshop scheduled for May 3, right after CDA Presents in Anaheim

By Nadean Burkett, for Dental Equities

It is estimated that more than 20 million teeth are extracted each year in the U.S. Although it is considered a routine procedure, it is also one in which the most complications occur, including infection and pain, which can lead to discord in the doctor-patient relationship. Is it any wonder that extractions are the procedure most feared by patients and most frequently referred out by general practitioners?

To address this challenge, Nexus Dentistry developed the Extraction Academy. Dr. Gregory Greenwood, chief dental officer of Nexus, is an internationally renowned lecturer on the latest trends in oral, IM, IN and IV conscious sedation in dentistry and a mentor to clinicians who want to improve their knowledge and skills in surgical procedures. This is particularly relevant in tooth extraction, which arguably is among the most difficult procedures to perform successfully.

Development of the Extraction Academy program was a collaboration with Greenwood’s colleague, Dr. Kianor Shah, who was the visionary of the project. Although every dental school teaches students how to extract a tooth, it is stigmatized by the public as the most brutal dental procedure. Greenwood and Shah share the belief that just because all dentists are trained to extract teeth does not mean that they should. With current advancements and technology available, extractions can be done safely and more comfortably for the patient. The techniques taught to post-graduates through the Extraction Academy include both theory and hands-on techniques, which enable clinicians to safely and effectively perform extractions for their patients with confidence.

Extraction Academy will present a one-day, hands-on workshop on May 3, immediately following CDA Presents in Anaheim, Calif. For details, visit www.EXTAcademy.com.

Conclusion

Until recently, many anticipated and feared ultimate replacement of the human touch with fully autonomous machines. Today, though, we believe that interconnection of dental and digital expertise arises from close understanding and collaboration between those with the real-world experience and those who “control the mouse” — and can lead to excellent results. A new term, coined by my colleague Domenico Lo Cuoco, a pioneer and supporter of digitization, concisely summarizes the lab technician’s evolving but still-central role: “ball-attachment technician.”

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