**QUIZ**
1/2 point CDT documented scientific credit. See Page 42.

# The Finesse of the Pink and the Power of IPS e.max

*By Rafael Santrich and Larry Grillo, DDS*

When damage to dentition is too severe for restorative treatment to be feasible, conventional dentures have been the treatment of choice. Conventional dentures, however, can be foul smelling and uncomfortable.[1] Additionally, jawbone resorption causes the dentures to become loose over time requiring readjustment of the jaw to ensure a proper fit.[2]

**Figures 1 and 2.** Preoperative images of the patient's dentition.

In some cases, if resorption has already occurred, the patient will no longer have sufficient bone structure to support dentures.[2] To overcome the disadvantages associated with conventional dentures, new implant materials and techniques have been developed, providing the growing edentulous population with more opportunities for functional, stable and comfortable treatments as well as decreased bone loss.[3] Due to the amount of masticatory forces placed on the prostheses as a result of implant support, stronger, more durable substructures and denture teeth are necessary to accommodate wear.[3]

## ☛ QUICK TAKE

In this case, the patient presented with severely worn and damaged dentition. After performing a panoramic X-ray of the patient's mouth it was decided that the complete removal of all remaining teeth was necessary. The agreed upon treatment was the application of the All-in-4 technique.

Zirconia is one of the strongest materials available in the dental industry today demonstrating a flexural strength of approximately 900MPa -1,100MPa.[4] Ideal for high-stress restorations, including implant dentures, zirconia restorations boast a failure-free reputation according to current research.[5] Designed and fabricated using CAD/CAM technology, zirconia substructures are stronger and more durable than traditional denture prostheses.[6] Innovative techniques provide long-term and patient-pleasing results.

When fitted with customized lithium disilicate dentition, fixed implant prosthetics will not develop a foul smell, require no realignment and provide a predictable, highly esthetic and life-long solution. In addition, CAD/CAM technology can be used in the office or laboratory for indications including full-mouth restorations, fixed partial dentures, implant abutments, crowns, veneers, inlays, and onlays,[7]contributing to faster and easier restorative treatments.

Suitable for restorations requiring high strength and exceptional durability, IPS e.max ZirCAD (Ivoclar Vivadent) is a yttrium-stabilized zirconia demonstrating a flexural strength of more than 900 MPa, and a fracture toughness more than twice that of glass-ceramic materials.[8] With approximately 50 percent porosity, the

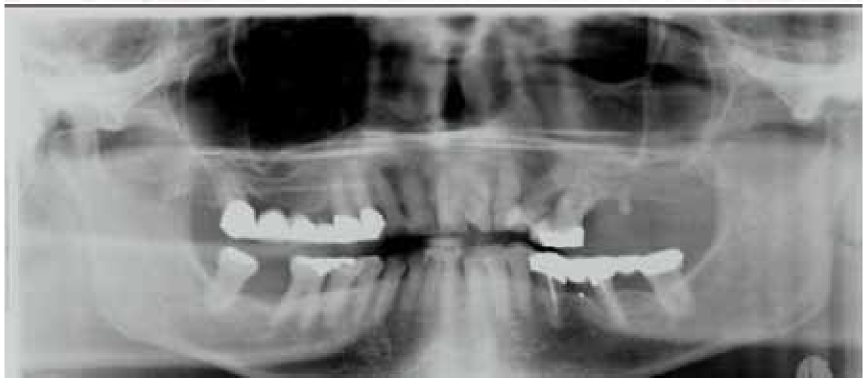

**Figure 3.** *(Above)*
Panoramic X-ray of the patient's mouth.

**Figure 4.** *(Left)*
Immediate dentures were placed the day of surgery.

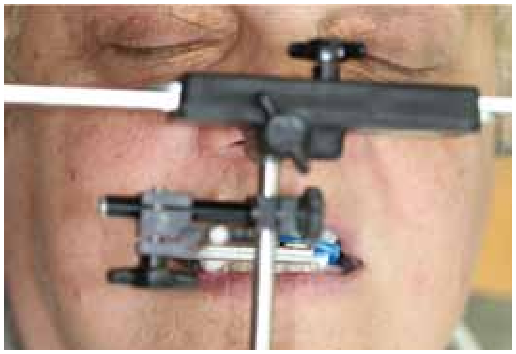

**Figure 5.** *(Above)*
A facebow transfer was performed.

**Figure 6.** *(Left)*
A zirconia-hybrid prosthesis would be fabricated for the upper arch and an acrylic prosthesis for the lower.

**Figure 7.** *(Left)*
Image of the duplicate denture.

pre-sintered blocks allow easy processing. Yet, once sintered to full density, its superior strength and inertness make it an ideal material for dental restorations.[8] IPS e.max ZirCad blocks (Ivoclar Vivadent) meet the functional requirements demanded by posterior masticatory forces.

Despite the use of different IPS e.max framework materials (lithium disilicate or zirconium oxide) esthetic results can still be achieved due to a selection of natural and shaded pre-sintered zirconium oxide blocks for color versatility, and when layered with esthetic ceramic materials, such as IPS e.max Ceram (Ivoclar Vivadent), exceptional esthetics can be attained.[9]

The lithium disilicate ingots are specifically designed for press-on procedures indicated for zirconium oxide-supported gingiva portions, single-tooth restorations, anterior and posterior bridges, inlay-retained bridges, and implant superstructures.[10]

Manufactured in nine block sizes, the larger ones suitable for long-span bridge frameworks or for stack milling and the smaller ones for copings, zirconia substructures can satisfy patient's demands for high-strength, highly esthetic, functional, fixed prosthetic results.[10]

The All-on-4 treatment concept (Nobel Biocare) includes fixed and removable prosthesis and can be used in combination with a full-arch zirconia substructure as well as a variety of implants (Nobel Active, Nobel Biocare). The ability to screw a provisional prosthesis onto the implants directly after surgery provides edentulous patients with an immediate implant-supported restoration.[11-15] Accommodating a wide range of abutments and prosthetics, this technique benefits patients by providing an esthetically pleasing, comfortable, stable and functional prosthesis.[11-16]

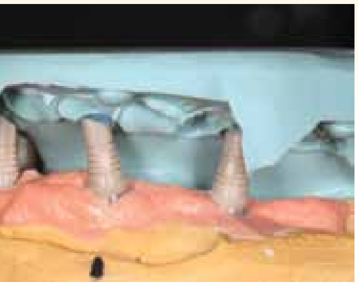

**Figure 8.** *(Above)*
Plastic temporary abutment placed over the multi-unit abutment.

**Figure 9.** *(Above)*
Part A&B of the resin is mixed together.

**Figure 10.** *(Above)*
The resin is applied to the denture.

**Figure 11.** *(Above)*
Image of the resin denture.

**Figure 12.** *(Above)*
The frame was designed and scanned.

**Figure 13.** *(Above)*
The zirconia frame was tried in.

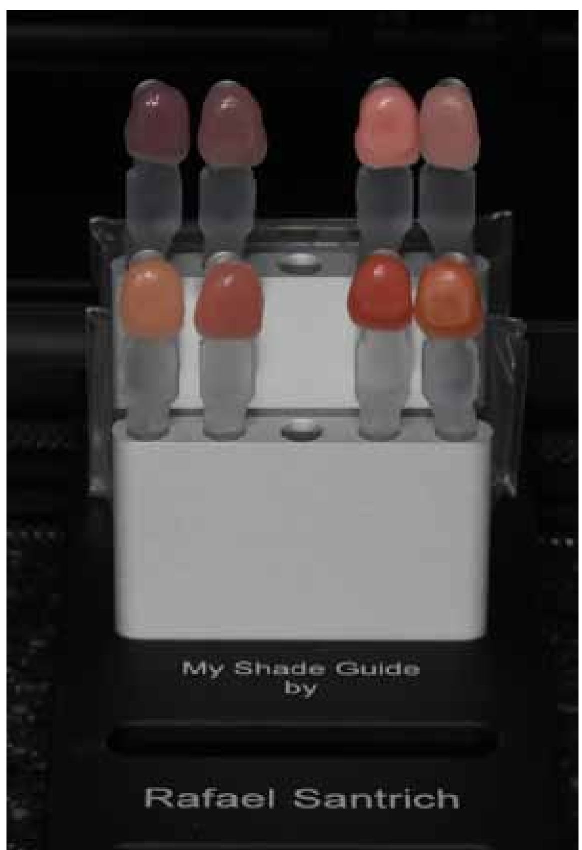


**Figure 14.** *(Right)*
IPS e.max Ceram pink colors were chosen from the shade guide.

## Clinical Protocol

The patient presented with severely worn and damaged dentition (**Figures 1 and 2**). After performing a panoramic X-ray of the patient's mouth it was decided that the complete removal of all remaining teeth was necessary (**Figure 3**). The agreed upon treatment was the application of the All-in-4 technique (Nobel Biocare).

Therefore, the first step was to guide the placement of the four RP Nobel Active implants, and the multi-unit transmucosal abutments used to facilitate tissue level emergence, by creating a precision surgical implant guide. Once the implants were placed, impression copings were inserted, an impression was taken from which to create the master cast and immediate dentures were placed (**Figure 4**).

A facebow transfer was performed to idealize the parameters for a precision restoration (**Figure 5**). At this point, the decision was made to fabricate a zirconia-hybrid prosthesis for the upper arch and an acrylic prosthesis for the lower (**Figure 6**). A laboratory verification jig was created from the master cast to guarantee the accuracy of the final fit. To set tooth arrangement and function, an occlusal wax rim was created. The set-up was then screwed in, the bite verified, and phonetics, function, and esthetics approved.

## Laboratory Protocol

The patient-approved immediate denture was duplicated and mid-line smile design and curve positions, i.e., Wilson spee, incorporated (**Figure 7**). The plastic temporary abutment was placed over the multi-unit abutment (**Figure 8**) and parts A and B of the resin were mixed and applied over the plastic abutment (**Figures 9 and 10**), creating the resin denture (**Figure 11**). The frame was designed and the scanning process performed (**Figure 12**). The zirconia frame was tried in (**Figure 13**).

A variety of samples of IPS e.max Ceram were chosen from the shade guide to produce natural coloration and mask the white zirconia frame (**Figure 14**). The color was tested with the same background as the frame color to evaluate the shade intensity of intensive dentin and dentin. The frame was characterized with Zirliner 1 and baked at 1060° Celsius to create a bond between the zirconia and ceramic (**Figure 15**).

**Figure 15.** *(Left)* The frame was characterized with Zirliner 1 and fired.

**Figures 16 and 17.** *(Left and Below)* A full-contour wax-up was completed.

**Figure 18.** *(Below)* The frame was masked by layering IPS e.max Ceram in intensive pink porcelain, opal enamel white and opal violet.

**Figure 19.** *(Right)* Characterization of the porcelain was finalized using Essence stains.

Figures 20-25.
The crowns were characterized with shades one and two of copper, white, cream, profundo, mahogany, ocean and sunset, then fired.





A full-contour wax crow design was completed (**Figure 16 and** 17). Intensive pink porcelain (IPS e.max Ceram) was built up to mask the frame and mixed with opal enamel white (OE4) and opal violet in specific areas to create a natural look. The bake speed was lowered to 35° per minute, held for one minute at 760°, cooled at a rate of 25° per minute and held at 350° for 15 minutes (**Figure 18**).

Characterization of the pink porcelain was finalized using Essence stains (Ivoclar Vivadent). Low speed rates were used to fire the glaze. Fired at 35° to 730° for one minute, the glaze was then slow cooled at 25° per minute and finally held at 350° for 15 minutes (**Figure 19**). Next, the

Figure 26. *(Right)*
The case was ready for bonding.



Figures 27-29.
*(Above, Far Left and Left)*
The case was primed with Monobond.

crowns were glazed with shades one and two of copper, white, cream, profundo, mahogany, ocean and sunset, then baked at 775˚ per one minute hold. (**Figures 20-25**).

## Seating

Once the patient was satisfied with the color, phonetics, and smile line (**Figure 26**), the case was prepared for bonding. The zirconia and titanium were primed (Monobond, Ivoclar Vivadent) to create mechanical and chemical retention in both materials. The case was then cemented using a universal adhesive implant cement (Multilink Implant, Ivoclar Vivadent) (**Figures 27- 29**). Prior to cementing the crowns in place, they were etched with a 5 percent hydrofluoric acid for 20 seconds (**Figure 30**). All crowns were cemented into place except those that fit over the screw holds (**Figure 31**), which would be cemented once the case was seated (**Figure 32**). Finally, the dentures were torque into place (**Figure 33**). IPS e.max crows were used in the upper arch and Phonares acrylic teeth in the lower (**Figure 34**) to equipoise the forces and achieve a balanced occlusion providing the patient with the highest quality of function and phonetics (**Figure 35**).

Previously limited to sometimes ill-fitting and painful false teeth, endentulous patients today have a variety of sophisticated treatment options. Due to their ease of use, predictability and its many advantages, CAD/CAM technology, pressable and milled ceramic materials and new implant structures enable dentists and laboratories to provide comfortable, stable and esthetic treatments to edentulous patients.[7]

Newly developed, innovative alternatives are more durable, esthetic and last longer compared to conventional options. Implant-supported dentures fabricated with materials such as zirconia and IPS e.max ZirPress not only demonstrate superior characteristics, but are stronger and more durable.[3,17] Modern procedures and materials can satisfy patient demands by providing denture treatments that are long lasting, strong and esthetically pleasing. **JDT**

**Figure 30.** *(Left)* The IPS e.max crowns were etched with a 5 percent hydrofluoric acid.

**Figure 31.** *(Left)* The crowns were cemented into place leaving the screw holds vacant.

**Figure 32.** *(Above)* Image of the healthy soft tissue and the angulation of the multiunit abutments.

**Figure 33.** *(Above)* The case was torqued into place.

**Figure 34.** *(Left)* Image of upper arch with IPS e.max crows and the Phonares acrylic teeth in the lower arch.

**Figure 35.** *(Right)* Postoperative occlusal view verifying balance and occlusion.

## QUIZ:

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CONTINUING APPROVED EDUCATION

NADL National Association of Dental Laboratories

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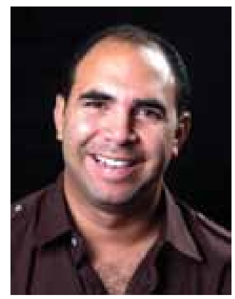

Santrich was born in Cali, Colombia. He earned his degree as a dental technician in 1992 and operates VM Lab Technologies in Aventura, Fla. He specializes in all fixed restorations and custom cosmetics. His cases and techniques have been published in Soft Tissue and Esthetic Consideration in Implant Therapy written by Dr. Anthony Sclar.

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