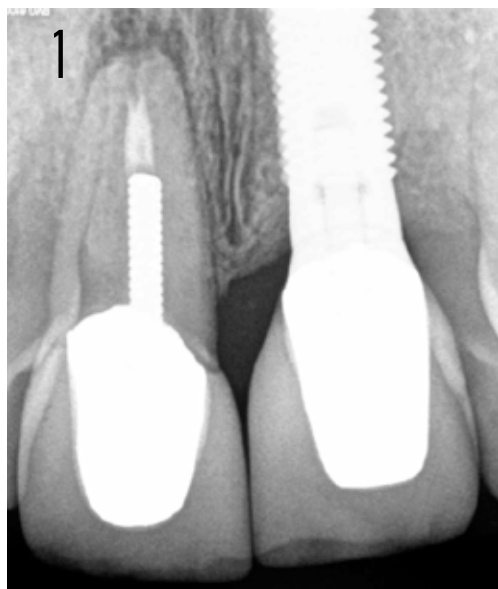


Restoring a Healthy Smile: Central Implant Restorations

Central Implant Restorations – A Case History

Our patient presented with a loose #8 natural central with a ceramic restoration. Close inspection from an endodontic specialist revealed a cracked root requiring removal.

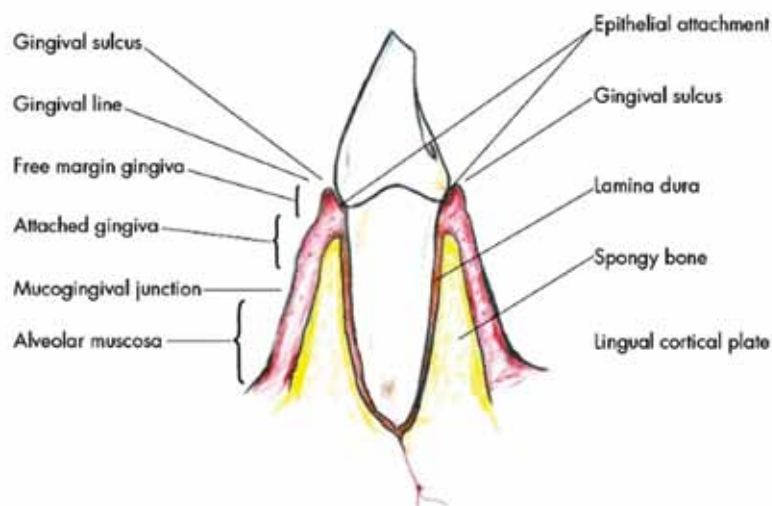


The site x-ray showed some bone loss on the #9 implant but it was still serviceable (Fig. 1).

A conservative treatment plan to ensure the highest chances for success was developed. The goal was to limit trauma and patient discomfort and to preserve the soft tissue.

Site #8 was grafted with bone at extraction and was allowed time to heal.

2 Natural tooth



The loss of a natural tooth, replaced by a dental implant, is a change in the biology of that site. All the natural structures that exist are now reduced to bone and soft tissue. The key factor in gingival success is maintaining the bone height at the crest of the implant. This will allow adequate peri-implant tissue to be shaped and visually support the emergence of the new restoration (Fig. 2).

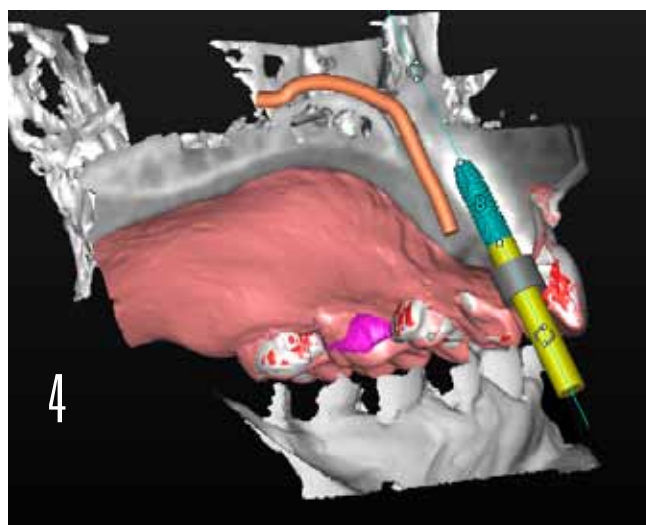
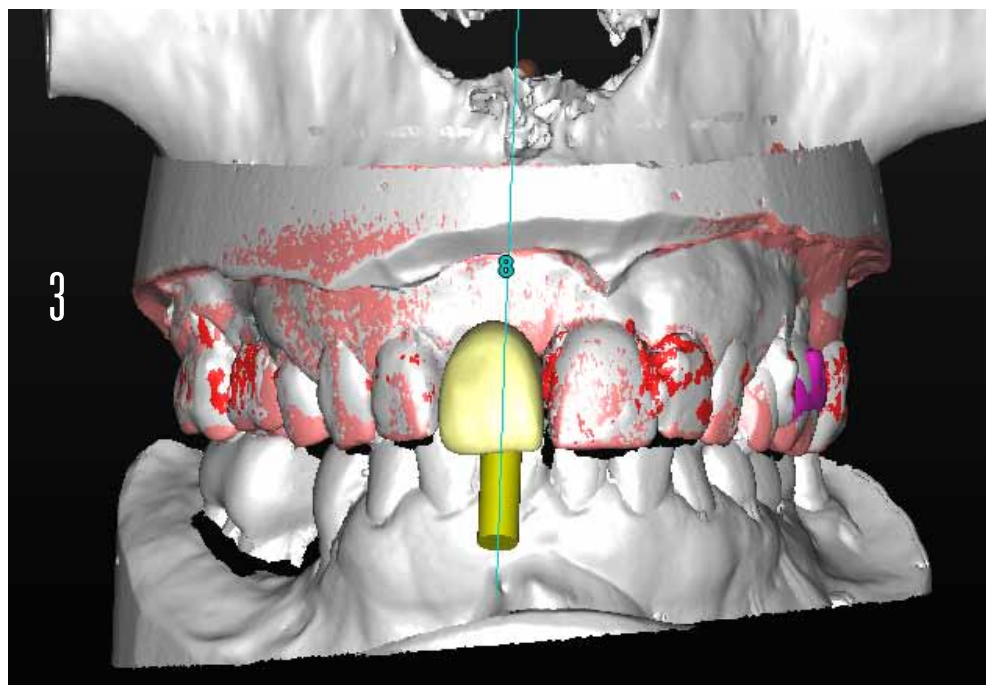
The technician created a diagnostic wax-up to replicate the lost tooth that would be used to establish the space and position needed for the implant. Simplant software merged all data to support digital planning for the implant site (Fig. 3).

Dr. Freedman, a trusted periodontist, reviewed the bone as well as the major nerves near the site. These features were carefully outlined and highlighted in color in the Simplant Software. With this information the ideal implant size was selected, preplanning the ideal angulation and depth of placement. Planning included the immediate smile feature that would include an abutment and temporary crown at primary placement.

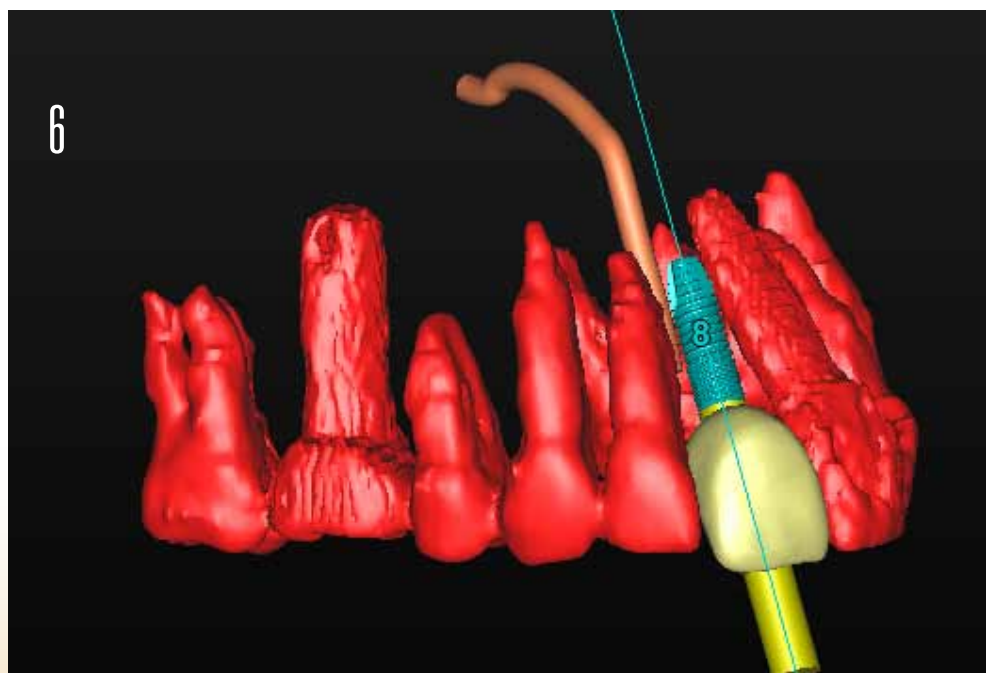
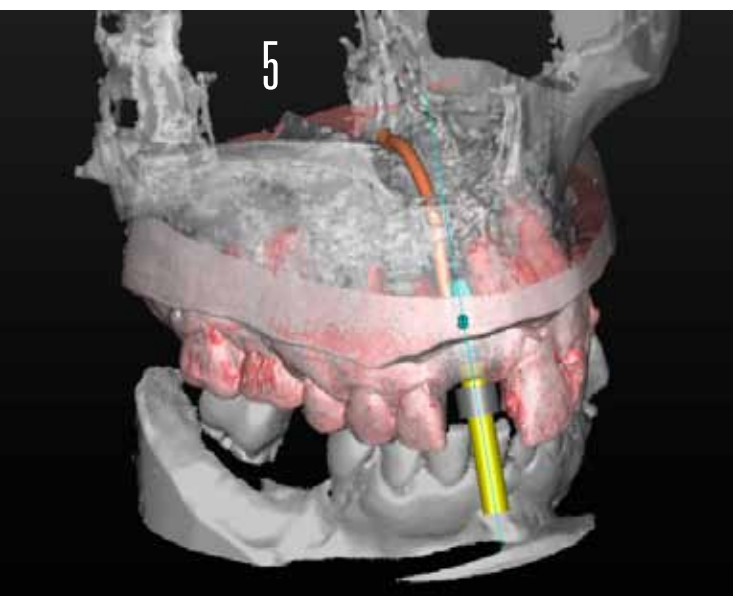
The ridge had narrowed in healing and the Astra Osseo-speed 3.5, 4.0 Aqua was the best fit for this space. Astra Implants were selected based on their ability to maintain bone height (Figs. 4-5).

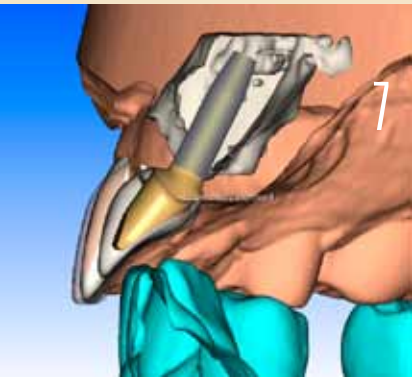
With the surgical plan finalized, Dr. Freedman placed the order for tooth supported guide from the Simplant website (Fig. 6).

The Dentsply Sirona Simplant guide was also ordered with the immediate smile protocol providing an abutment and temporary from Atlantis. The case was imported from the Simplant software directly into Dentsply Sirona; Atlantis Web Order utilizing the planning and scan data generated in Simplant. The Atlantis software also imported a section of the bone to allow the implant abutment and crown to be designed for the site.



THESE FEATURES WERE CAREFULLY OUTLINED AND HIGHLIGHTED IN COLOR IN THE SIMPLANT SOFTWARE.





The Virtual Aided Design image showed the bony defect at the site that will be grafted at the day of surgery (Fig. 7).

On the day of surgery, the preplanned guide, the Dentsply Sirona Astra Aqua implant and the surgical kit was in place for Dr. Freedman to perform surgery. The doctor also prepared a vacuum stent to check his placement (Fig. 8).

The guide was placed and per a series of drilling steps the osteotomy was created (Fig. 9). The placement was checked with the stent and harvested bone was placed around the site.

A membrane was placed to hold the bone in place during healing and osseointegration (Fig. 10). The site was beautifully sutured closed (Fig. 11). As a final check, the newly placed implant was x-rayed (Fig. 12).

The doctor decided to not immediately load this case at primary placement. A more cautious route was taken in this situation. Before the patient left, Dr. Freedman adjusted the patient's Essex appliance to minimize tissue contact.

Healing and osseointegration was successful. In this case there was some bone remodeling, most noticeable in the existing Zimmer site. The prominent ridge was now less so; this impacted the emergence profiles of the two centrals. The implant

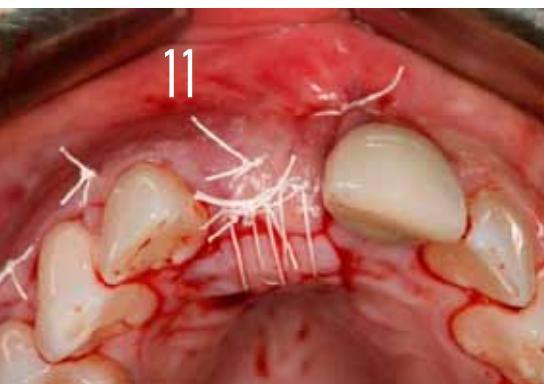


was uncovered with a careful flap created to maximize tissue volume at the site and a healing cap was placed (Fig. 13).

The site was allowed to heal and an appointment with Dr. Kirk was scheduled to impress the two implant sites.

Restorative challenges existed for this case. Mimicking the same emergence profiles was important for success. The existing Zimmer 4.5 TSV and the new Astra Osseo speed TX 3.5 Aqua had different connections and different base diameters that would influence the emergence. The actual fixture levels would most likely be at different heights.

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Dr. Kirk removed the #9 crown and abutment, attached transfer copings and impressed the two sites.

For ease, the original crown on #9 was repaired and the Essex was used for a few more days.

The impression was poured and the case was mounted to a WM2240 articulator based on face bow settings captured in prior procedures.

A Dentsply Sirona Atlantis case was ordered in Web Order (AWO): two gold-shaded abutments with the emergence of contour tissue. Cutback Copings in 11T (vita A-1) zirconia were ordered as well. Send image hold was selected for review before approval. Full crowns were digitally placed in the Virtual Aided Design software, a proprietary software used by Dentsply Sirona, and the designs were available for review the same day.

Dentsply Sirona scanned the model work. Virtual Aided Design software suggested abutments and crowns based on site location (Figs. 14-15). The certified Atlantis design team oversaw the output of the VAD software and coordinators were available to assist in design realization.

The emergence needed to be the same for each central restoration to ensure a matched pair of centrals. Peri implant tissue is moldable and stable, if the bone is stable to the implant. This is why implant selection is critical to long term success.

Tissue differences between the sites

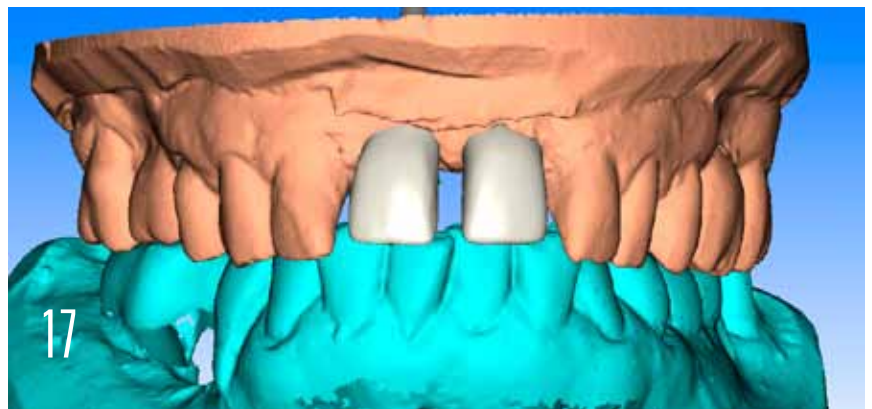
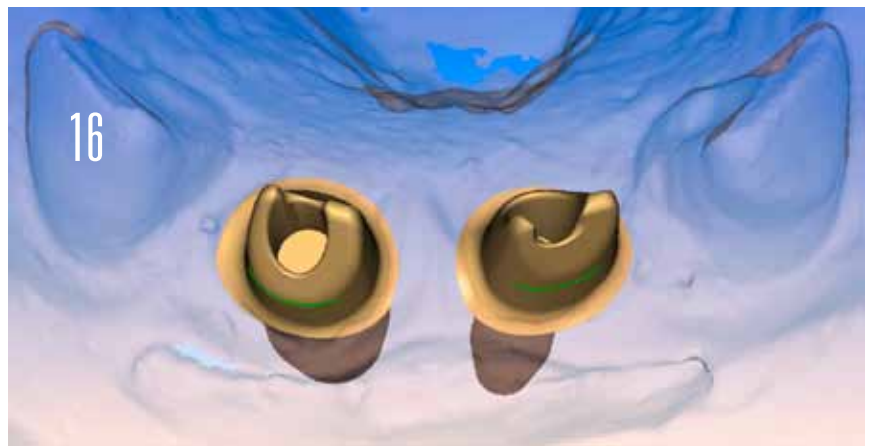
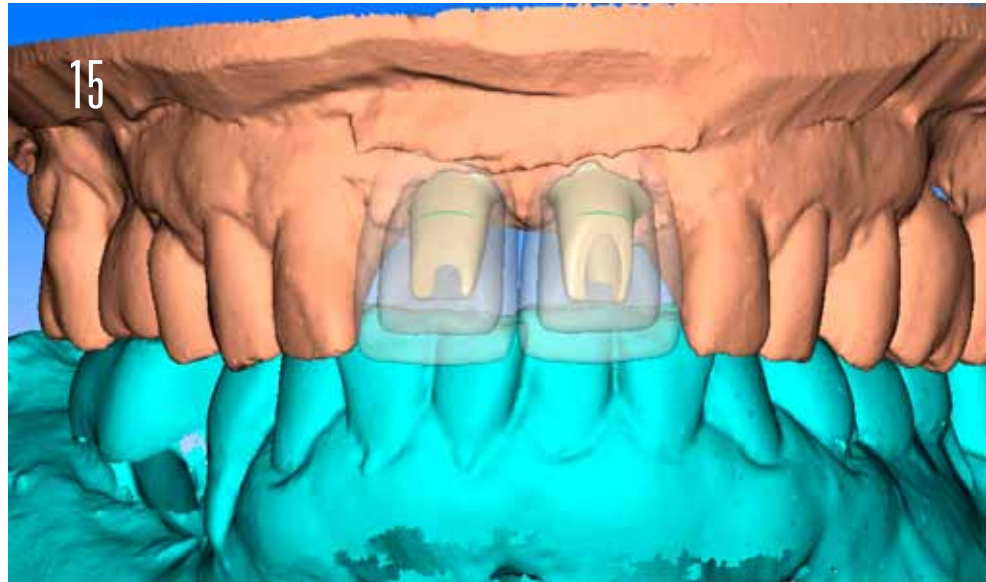
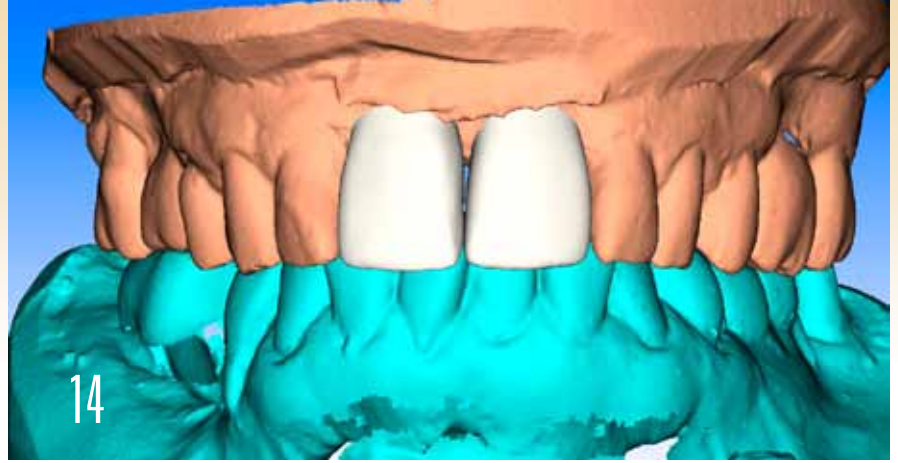
The implants displayed a difference in thickness and in depth of placement. The Zimmer was close to the crest of the tissue, but in a workable position. A distinct advantage was the availability of both implant systems in one engineered design system. Dentsply Sirona Atlantis engineered the interfaces of all its abutments to optimize the connections.

The occlusal view of the abutments showed how the emergence at the finish line had been harmonized between the abutments. A concave base shape was used to allow good blood flow to the tissues in the sulcus (Fig. 16).

The restorations were hand-layered Dentsply Sirona Ceramco PFZ porcelain. The aesthetic zone required the creation of intrinsic shading and enamel overlay that currently was only possible with a veneer (Fig. 17).

This case went directly onto the porcelain bench right from Atlantis. The laboratory could create and deliver the final restorations in a few days.

The abutments and cutback copings were moved into processing automatically, upon approval



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in AWO. All the parts route automatically and are manufactured in tandem; marrying up in the final inspection (**Fig. 18**).

The manufacture of the abutments began with an automated tool path generation on an Atlantis 5-axis milling machine. Inspections validated the part when complete. Atlantis did not do any post-finishing on the geometry of the implant abutment.

The zirconia copings were milled and then sintered to the final size in a slightly longer process. When both parts were complete, metrology inspected the fit to ensure quality. The completed and inspected parts were returned to the customer. In this case, a hand veneer layer was added to the zirconia copings. Layering of translucent incisal was added with body porcelains to achieve a natural tooth look.

Dentsply Sirona Ceramco PFZ micro fine porcelain was selected based on the product's engineering to resist chipping, often cited as an issue with veneered ZIR substructures. Ceramco PFZ porcelain was balanced for ideal thermal compatibility

with zirconia. The ceramicist used an A-1 liner on the copings.

PFZ Opacious dentin was useful in masking substructure brightness. For this case the body porcelains were layered with a lateral segmented cutback for a second bake of incisal porcelains. The incisal layer was pulled down through the full crown to lighten the shade just a bit. Ceramco PFZ layers fused beautifully in multi-layer firings; there was no mark off between firings allowing complex incisal layering with absolute control by the ceramicist (**Fig. 19**).

Interproximal contacts were established along with the functional movements. These centrals must harmonize with the anterior functions to allow proper chewing and tearing of food as well as speech. The functional path set the correct incisal edge (**Fig. 20**).

The crowns final surface was created with assorted finishing wheels and points. A natural glaze was preferred by this ceramicist to replicate a natural tooth surface.





THE CHALLENGE FOR THIS CASE WAS TWO IMPLANTS IN THE CENTRAL LOCATION.



Lost natural dentition cannot be replaced. Restorative dentistry is the illusion of natural dentition. The challenge for this case was two implants in the central location. Bone loss of the #9 position compromised the central papilla. In this situation the mesial contact had to be brought into a broad shape to close the area while maintaining a natural appearance. The technician's job was to minimize any oddity in the visual display and allow the tissues to mature, stabilize and fill in. The goal was to maximize esthetics in the areas we can control on the crowns and minimize distractions. All patients are unique; this patient had very prominent centrals.

The day of delivery ultimately proved if all the skill and efforts of the restorative team came together (Fig. 21).

Dr. Kirk was supplied with abutment insertion guides to carry the abutments to the restorative site. The insertion guide fit at the margin of the abutment and helped displace any tissue and ensured correct alignment to the internal hex of the implant (Fig. 22).

The abutments were tried in to verify the fit and then torqued to the proper manufacturer's torque settings. The Dentsply Sirona Atlantis coping was engineered to allow 40 microns of room for the cementation. This was a match to the thickness of dental luting materials.

The abutments displaced and controlled the tissue as anticipated, moving the soft tissues and controlling the emergence with regularized base shapes below the finish lines (Fig. 23). The finish lines were placed below the gingival visually while keeping the margins accessible for cement removal. The restorations established the CEJ transition from the implant root to the new crown (Fig. 24).

In this case no interproximal modifications were needed — a testament to the accuracy of the doctor's impression technique which was poured

QUALITY IS
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with a proper dental stone. A small adjustment was needed in the protrusive contact of #8 to relieve an excursive interference.

The patient was very happy to have her new centrals and the shade match was good. The papilla was less than optimal around the older Zimmer implant, but acceptable (Fig. 25). Her lip will hide the discoloration from the older implant.

Aldo Gucci once said, "Quality is remembered long after price is forgotten." Our patient has benefited from the quality of the dental care matched with proven quality materials and processes, backed by medical studies. The restorative team feels confident the restorations will provide long term success and aesthetics (Fig. 26). **JDT**



Our Happy Patient

About the Author

Jon M. Bergstresser, CDT, manages the Dentsply Sirona Atlantis design team in Waltham Mass. With over 30 years of work in restorative dentistry, Jon has worked in office, in his private laboratory and for the past ten years supporting the Atlantis product line. Large organization or small, Jon believes the key to adding value is honesty and integrity in all areas of endeavor. Problem solving to find the best overall solution is where Jon likes to spend his time, whether sailing his small sport trimaran, metal working, wood working, or restorative dentistry.



Special thanks to:

Dr. David Kirk, for his overall management of this case, from temporization, impressions and final delivery.

Dr. Jeffery Freedman, for the excellent surgical placement of the Astra implant and tissue management.

The Dentsply Sirona teams supporting Atlantis, Prosthetics (Ceramco PFZ), Simplant and Astra Implants, whose expertise, product offerings and support was invaluable and Mariann Gentile and Thomas Kunn for support with Dentsply Sirona Simplant planning.

Our patient who agreed to allow me to publish this.

*Images of the implant surgery courtesy of Dr. Jeff Freedman, Periodontology Associates

*Images of the technical procedures courtesy of Jon Bergstresser, CDT, Dentsply Sirona

*Images of the restorative stage/seating courtesy of Dr. David Kirk, Kirk Dental Associates

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