

CS 3500 Intraoral Scanner

Custom Implant Abutment and Crown Fabrication Using Digital Scanning

Joseph D. Mazzola, D.D.S

Clinical Case Study

Case History

A 49-year-old female, non-smoker, with no significant medical history presented to the office reporting chronic bite sensitivity on tooth #18. The patient complained that the pain was increased by chewing and she had to take ibuprofen to treat the symptoms; however, the over-the-counter medication had lost its effectiveness. The patient had reported past problems with bruxism and had a mandibular occlusal appliance to cover the offending tooth. The mandibular occlusal bite plane had a good fit over the crown.

Visual examination revealed that tooth #18 had previously been treated with root canal therapy, a crown build up and E-max ceramic crown. The clinical crown appeared to be within the normal limits—

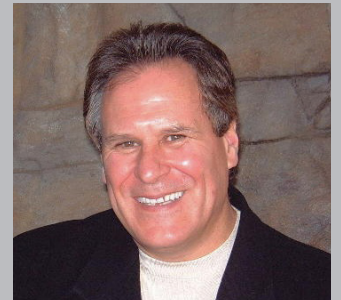


Fig. 1



Fig. 2

no fractures, no mobility, no decay and the occlusion appeared to not be a contributing factor. The crown was a year old and the symptoms had only appeared recently. A root canal fill with no other discernible information as to the cause of the bite sensitivity was confirmed after radiographic evaluation (Figs. 1-2). Hyper occlusal force syndrome, failing root canal therapy or root fracture were all considered as differential diagnoses.



Joseph D. Mazzola, D.D.S.

Dr. Mazzola graduated from Regis University in 1979 with a Bachelor of Science in Chemistry. He was admitted to the Loyola University, School of Dentistry, Maywood, Ill., in 1979. He also chose to do additional work in both periodontics and oral surgery specialties.

Following graduation in 1983, Dr. Mazzola began general practice dentistry in Broomfield, Colo. He immediately began study of temporomandibular disorders and occlusion, observing the link to periodontal disease. He completed the course work recognized by the Academy of General Dentistry and was awarded a Masters in the Academy of General Dentistry, which has been granted to less than 3,000 dentists worldwide.



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The patient was treated conservatively with multiple occlusal adjustments and antibiotic therapy. Three weeks after the treatment, the symptoms had not subsided—they were in fact worsening—and ibuprofen was no longer keeping her comfortable. It was recommended that the patient receive a CBCT scan (Figs. 3-4) to retrieve further radiographic information that would be available on a three-dimensional image. During the evaluation of the CBCT images, it was determined that tooth #18 had the beginnings of a bifurcation involvement either related to a strip perforation of the distal root concavity on the mesial buccal root or a fracture through the floor of the pulp chamber.

The patient was notified that the next line of treatment would be removing the tooth and immediately place an endosseous implant. The patient preferred not to risk having further symptoms with the tooth and elected to have the implant placed.

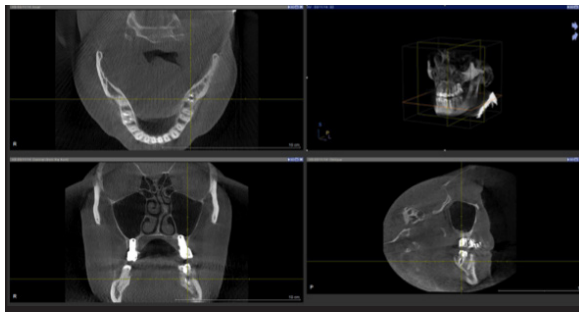


Fig. 3

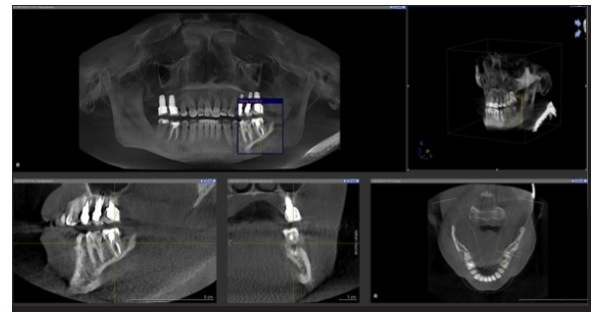


Fig. 4

Treatment Plan

The treatment plan included atraumatic removal of the tooth, immediately placing an endosseous implant with bone grafting and no loading. The final restoration would be a custom-milled abutment and custom-milled E-Max crown made from digital models created with the Carestream Dental CS 3500 intraoral scanner.

First, tooth #18 was atraumatically removed and a 5.7 x 10 Zimmer implant was immediately placed with accompanying bone graft. It was not submerged. A 3x6 of THC 536 healing abutment placed and the implant left to heal for six months, after which the assessment of the integration was completed.

Next, the CS 3500 and laboratory fabricated scan bodies were used to create a digital impression. Scan bodies are similar to indirect impression copings and are supplied by implant companies or the digital laboratory that will create the final abutment and crown.

The soft tissue collar and implant head were scanned first without a scan body to insure good tissue adaptation to the abutment and avoid tissue slump (Fig.5). Then, the opposing quadrant and bite were scanned to create a complete virtual model of both quadrants in occlusion.



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Upon completion of the virtual modeling of both arches and bite, a scan body virtual model was created to identify the position and angle of the implant located in the bone and tissue in three axes. The scan bodies were screwed to the implant platform and radiographic confirmation of seating was performed.



Fig. 5

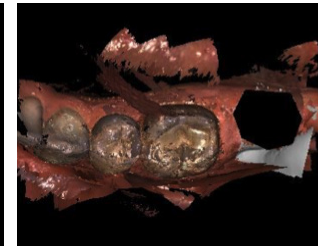


Fig. 6

The CS 3500's CS Acquisition software automatically opened a copy of the virtual arch with the implant fixture platform and the soft tissue collar visible. Using a cut tool within the software, the soft tissue was cut in a circle and removed with the platform image from the virtual model (Fig. 6). With the scan body in place, the implant was digitally rescanned (Fig. 7). The new images were stitched in place within the virtual model software in the exact position where the implant was in the bone with the soft tissue collar capture (Fig. 8).



Fig. 7



Fig. 8

The STL files of the digital models were then submitted to my preferred lab. As usual, I requested 2D screenshots of the abutment and restoration for confirmation before milling. Once approved, milled and finished, the abutment and restoration (Fig. 12) were shipped to my practice in four business days and were ready to be seated (Figs. 13-15) The patient is completely happy with the results and glad to have her restoration in place (Fig 16).

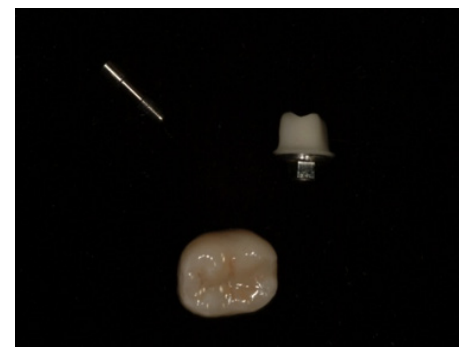


Fig. 12



Fig. 13



Fig. 14



Fig. 15



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Conclusion

Today, we no longer need to take traditional impressions for any of our single unit—and many multiple unit—implant crowns, bridges and abutments. Restorations can be scanned with a digital scanner and submitted to a lab via the internet. At my practice, I request 2D screen shots from the lab to be reviewed and approved before fabrication. Also, the laboratory always prints a 3D epoxy model that is returned with the abutment and crown. This method can be completed for any crown and bridge case using the CS 3500 intraoral scanner from Carestream Dental.



Fig. 16

Testimonial

The era of computer-aided design and computer-aided manufacturing (CAD/CAM) is here to stay. CAD/CAM has been proven to provide increased accuracy, higher quality fabrications and more predictable results when it comes to restorations and models. At the very least, oral health professionals should embrace digital scanning technology, if not milling/3D printing.

The CS 3500 intraoral scanner is perfect for professionals looking for a small and user-friendly scanner. It's not tethered to any proprietary computer or cart. Not only will your practice save on impression materials, it will also save on model stone and the labor required to pour models and prepare them for laboratory shipping or pickup. Plus, scanned models and laboratory prescriptions can be sent to a lab through an internet portal with minimal effort. The quality and speed of patient record delivery to laboratories allows the dentist to provide treatment to patients with high accuracy while saving time for the office and the patient.

If you are concerned about staying current with the latest trends in technology, a digital scanner is a must. The CS 3500 is the best choice for any office.

Would you like to know more? Please call **800.944.6365** or visit us on the web at **www.carestreamdental.com**.

