PracticalPROCEDURES No.30
PROVIDING SOLUTIONS FOR CLINICAL CHALLENGES

Use of a CAD/CAM System to Fabricate an Implant-Supported Restoration

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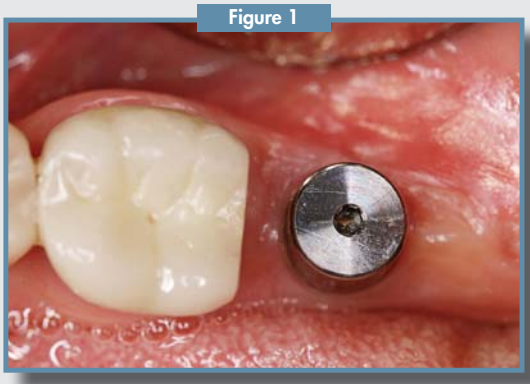
When patients present with failing restorations, the clinician is challenged to select a treatment alternative that will provide improved aesthetics and strength. When faced with the replacement of a failed implant-supported crown or bridge, the clinician is further challenged to deliver a durable restoration that will not result in further patient disappointment. The evolution of CAD/CAM technology (eg, CEREC, Sirona, Charlotte, NC) has enabled clinicians to deliver implant-supported prostheses in the anterior and posterior regions with increasing predictability and strength. In particular, CAD/CAM systems allow the clinician to:

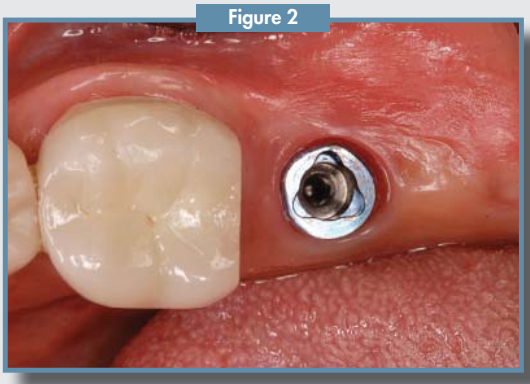
- Provide a long-term restoration that demonstrates natural aesthetics and enamel-like wear characteristics;
- Utilize a high-strength ceramic material that will resist fracture and support occlusal load; and
- Eliminate extensive provisionalization to allow tissue adaptation and restoration delivery.

Figure 1



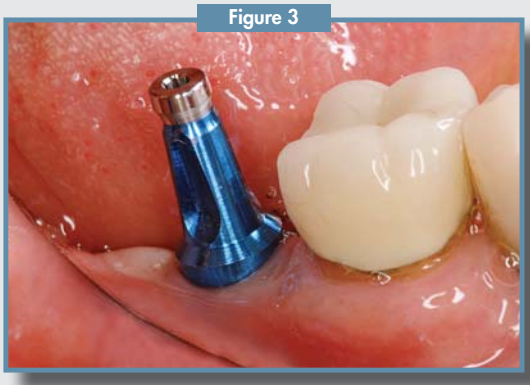
A 65-year-old female patient presented with a preexisting FPD. The healing abutment was in place upon presentation and the contours of the mesial tooth required adjustment.

Figure 2



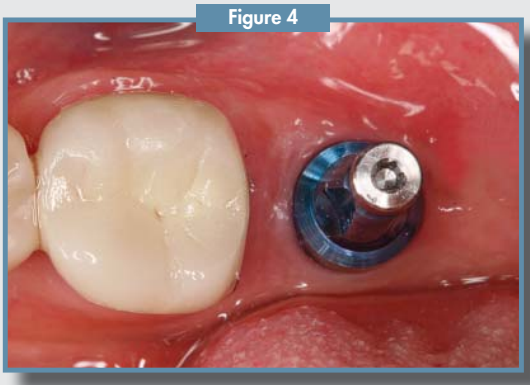
The healing cap was removed to evaluate the soft tissue contours. Because of the implant's location, a durable restorative material (IPS e.Max, Ivoclar Vivadent, Amherst, NY) was required.

Figure 3



An impression coping was positioned to ensure accurate communication of the soft tissue contours and the anticipated implant angle and position.

Figure 4



Because the patient's financial limitations prevented complete replacement of tooth #19, the mesial aspect of the tooth was reduced to improve its contours.

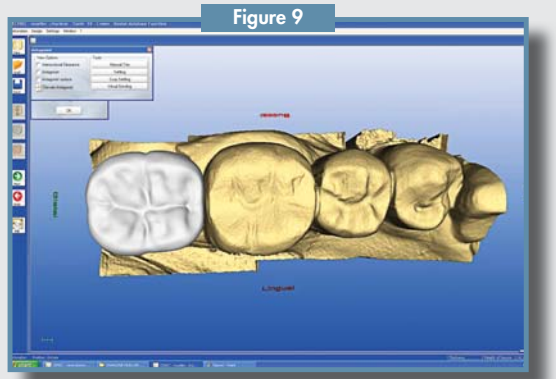
CAD/CAM Procedures and Protocol

In order to ensure development of an aesthetic prosthesis that provides a reliable fit and seating on the implant fixture, the following protocols are required:

- Accurate fixture-level impression capture;
- Development of an anatomical soft tissue model; and
- Precise CAD/CAM scanning.

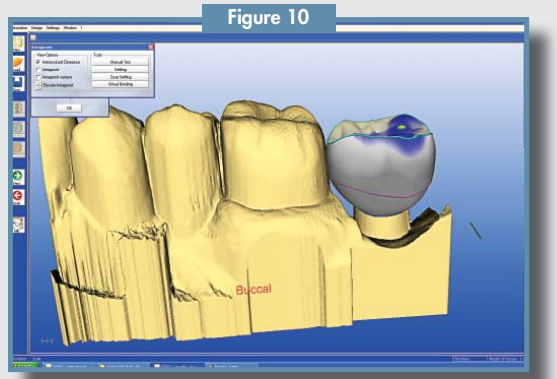
Once the model has been scanned, the crown restoration can be designed using the proprietary software to ensure that the definitive restoration is created with appropriate interdental contacts, occlusal anatomy, size, and shape. The virtual model can be rotated and evaluated from the facial, lingual, occlusal, and buccal perspectives in order to eliminate potential error prior to the actual milling of the restoration. Once the design is approved, the restoration can be milled directly in the clinician's office, and a customized staining technique can be applied to create a natural appearance for optimal results.

Figure 9



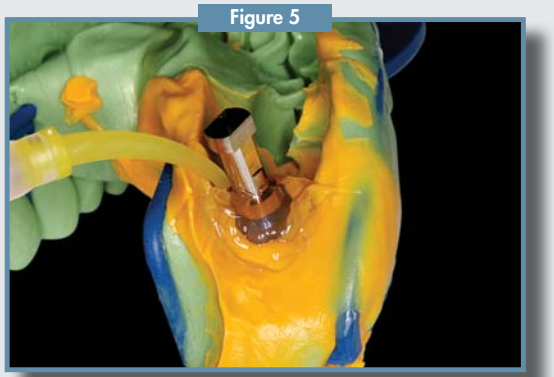
The software was used to develop the proposed restoration that could be modified as needed by the user. The occlusal aspect was evaluated to ensure proper contours.

Figure 10



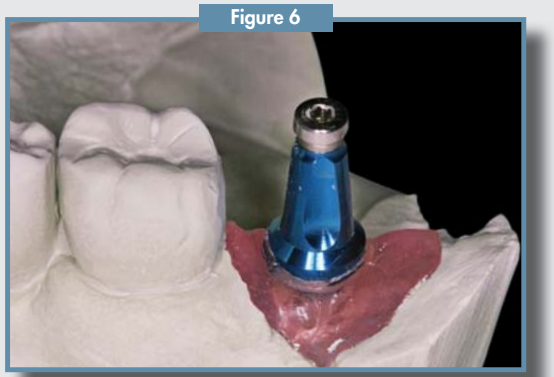
The virtual model was then rotated to verify that correct contours and interdental contacts were established. Evaluation of the buccal aspect also allowed the user to review potential stress points.

Figure 5



A fixture-level impression was made to capture the intraoral representation of the implant. A laboratory analog was placed on the impression coping, and a soft tissue material was placed around the implant.

Figure 6

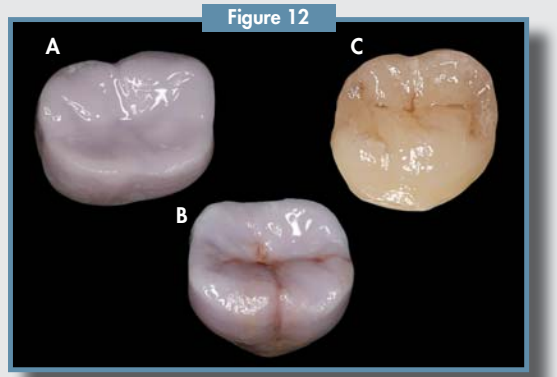


A stone model was poured to allow extraoral evaluation of the soft tissue anatomy with the implant analog in position.

Figure 11

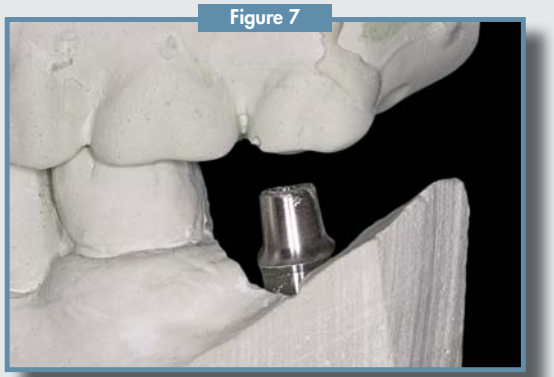
The restoration was subsequently milled using a durable porcelain material (eMax, Ivoclar Vivadent, Amherst, NY). Once the milling cycle was complete, contacts and fit were verified on the model.

Figure 12



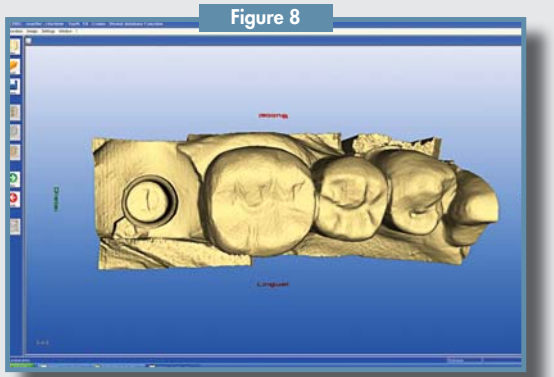
The restoration was retrieved to allow crystallization (A). Additional effects were added to provide a natural appearance and aesthetics (B). The definitive CAD/CAM-fabricated restoration demonstrated optimal luster and characterization (C).

Figure 7



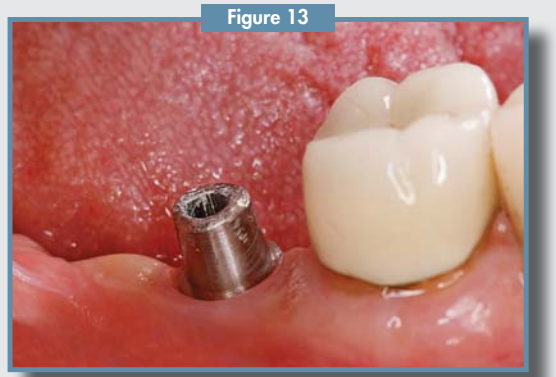
The appropriate abutment was placed and occlusal clearance was verified.

Figure 8



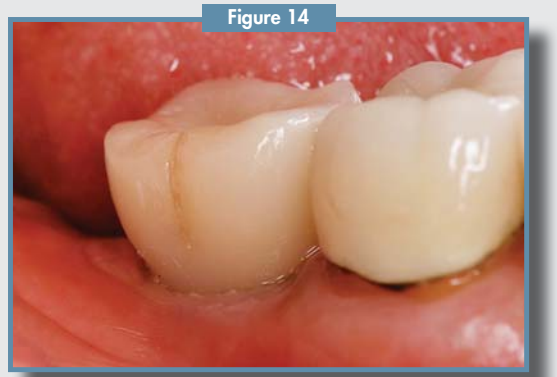
The abutment was scanned (CEREC, Sirona, Charlotte, NC), and a virtual model was created.

Figure 13



The abutment was transferred intraorally and tightened with a torque wrench. Because the definitive restoration was quickly fabricated in the office, tissue collapse was not noted.

Figure 14



Postoperative appearance of the definitive restoration following cementation and verification of occlusion. Note the natural tissue integration and harmony.

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