E4D CAD/CAM Restorative System

Placing a Maryland bridge using the in-office system to achieve a long-term temporary restoration.

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Options for replacing a missing anterior tooth in a 14-year-old patient are very limited. The ideal final treatment modality is to place an implant; however, this cannot be accomplished in a child or adolescent until he or she has stopped growing. Maintaining the space until an implant can be placed is achievable with a temporary removable partial denture (RPD), an Essix retainer, or a fixed resin-reinforced ceramic Maryland (FRRCM) bridge. Although temporary removable partial dentures and Essix retainers (DENTSPLY Raintree Essix, www.essix.com) are relatively cost-effective, both can be uncomfortable. Talking and eating with such restorations can be challenging. Also, there often is an esthetic compromise with a removable prosthesis. In contrast, a fixed Maryland bridge can provide a comfortable, strong, and esthetically pleasing long-term temporary solution. The restoration can be fabricated using an in-office CAD/CAM system (eg, E4D, D4D Technologies, www.e4d.com; or CEREC® 3D (Sirona Dental Systems, www.sirona.com). Such systems offer both the dentist and the patient the options of a quick turnaround time, an accurate fit, and direct control of color and shape.

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The E4D in-office CAD/CAM system is a comprehensive scanning, designing, and milling system for chairside use. Both preoperatively and during preparation, E4D can scan the soft tissues and tooth structure, as well as all bite registration materials, without the need for a contrast agent or opaque medium such as powders or sprays. After intraoral scanning, the software creates a model, after which the design process can begin. Autogenesis provides an optimized restoration design using information from the opposing dentition (bite), preoperative condition, wax-up, or scans of provisional restorations. For patients who require a detailed or unique design, a full suite of design tools provides unlimited control of every aspect of design.

The approved restoration is sent wirelessly to the E4D mill, which then fabricates a high-strength ceramic or composite restoration (eg, IPS Empress® CAD and IPS e.max® CAD, Ivoclar Vivadent Inc., www.ivoclarvivadent.com; Paradigm™ C and Paradigm™ MZ100, 3M ESPE, www.3mespe.com). After polishing, staining, and glazing, this system can provide excellent restorative and esthetic care.

To fabricate the CAD/CAM FRRCM bridge, a two-part system that consisted of a composite framework using Paradigm MZ100 and a porcelain veneer using IPS Empress CAD Multi block was used. The composite framework was used because it is more flexible than porcelain and can better resist stress in multiple directions. Composite is less brittle than porcelain, so it is less likely to fracture under flexion stress. Esthetics is an issue with composite restorations, as the material is monochromatic. To improve the esthetic outcome, a porcelain veneer was created to overlie the framework. Combined, the composite framework and porcelain veneer provide the flexibility and esthetics required for success.

Case Presentation

Prior to completion of orthodontic treatment, the patient and her parents presented to discuss options to replace a congenitally absent right lateral maxillary incisor. After reviewing all treatment options, the ultimate goal was deemed to be an implant. However, given the patient's age, this goal was considered unattainable for several years. Consequently, a long-term, temporary solution was needed. The patient and parents expressed a desire for an option other than a temporary RPD to replace the missing tooth, based on the experience of a family friend who had received a temporary RPD under similar circumstances. In addition to the friend's dissatisfaction with the fit and esthetics, the denture had fractured several times. After discussing options, a decision was made in favor of having a FRRCM bridge fabricated.

FIG. 1

FIG. 2

CASE EXAMPLE (1.) Preoperative photograph of a missing maxillary right lateral incisor. **(2.)** 3-D digital model created with the E4D system.