Fabricating complete dentures with CAD/CAM technology

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Conventional complete denture prosthetics require several appointments to register the maxillomandibular relationship and evaluate the esthetics. The fabrication of milled complete dental prostheses with digital scanning technology may decrease the number of appointments. The step-by-step method necessary to obtain impressions, maxillomandibular relation records, and anterior tooth position with an anatomic measuring device is described. The technique allows the generation of a virtual denture, which is milled to exact specifications without the use of conventional stone casts, flasking, or processing techniques. (J Prosthett Dent 2014;■■■■)

Present-day advances have led to the incorporation of computer-aided design/computer-aided manufacturing (CAD/CAM) technology into the design and fabrication of dental restorations, including complete dentures. Different systems for making impressions and fabricating casts of a patient’s dental structures have been introduced, 1,2 some of which also allow for the production of specific restorations in the laboratory, in the dental office, or at a centralized production center. 3-5

The information for the development of a CAD/CAM cast or restoration can be acquired extrarally from an impression or from a cast of the object or intraorally by directly recording the structures intraorally. Different systems use different tools to collect this information. Mechanical digitizing systems rely on touch probes (tactile), 6,7 whereas optical digitizing systems use cone beam computed tomography, 8,9 laser, 5 or light-emitting diode scanners. 5,6 These data are processed by software and then used to fabricate the desired object or restoration with the CAM portion of the system.

In 2007, Quaas et al 6 studied the measurement uncertainty and the 3-dimensional accuracy of a mechanical digitizing system and concluded that the measurement uncertainty for the system was low and the precision was high. However, they discouraged the application of this method for the digitization of flexible impression materials because the physical contact of the probe with the soft material might lead to deformation and increased inaccuracy. In 2012, Goodacre et al 7 proposed a technique to obtain maxillary and mandibular definitive impressions of the edentulous arches so these could be scanned and data acquired to mill denture bases with CAD/CAM technology. They also described the process for recording the neutral zone, the maxillary and mandibular anterior teeth position, the palatal morphology, the occlusal vertical dimension, and the interocclusal relation so these could be included as part of the process of fabricating the bases. Furthermore, they used a prototype of 3-dimensional software that allowed the milling of the tooth sockets in the denture base according to the desired arrangement.

The use of computer-generated dentures is changing the procedures for denture fabrication. CAD/CAM technology differs from the conventional method in that the laboratory work is simplified and fewer appointments are needed. 10 Recently, Bidra 11 reported the use of CAD/CAM technology for the fabrication of mandibular implant-retained overdentures in only 2 clinical appointments. This report describes a technique to fabricate a complete dental prosthesis with CAD/CAM technology. The technique presented uses a standard clinical procedure to fabricate dentures for a patient with existing dentures in only 2 appointments. The measurements were recorded at the first appointment and inserted at the second appointment.

TECHNIQUE

1. Make a definitive impression with the impression materials and thermoplastic moldable trays which are

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