Life expectancy of the fixed complete denture

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Patient education regarding prosthetic maintenance needs and timelines comes from years of collaboration between prosthodontists and dental laboratory technicians.

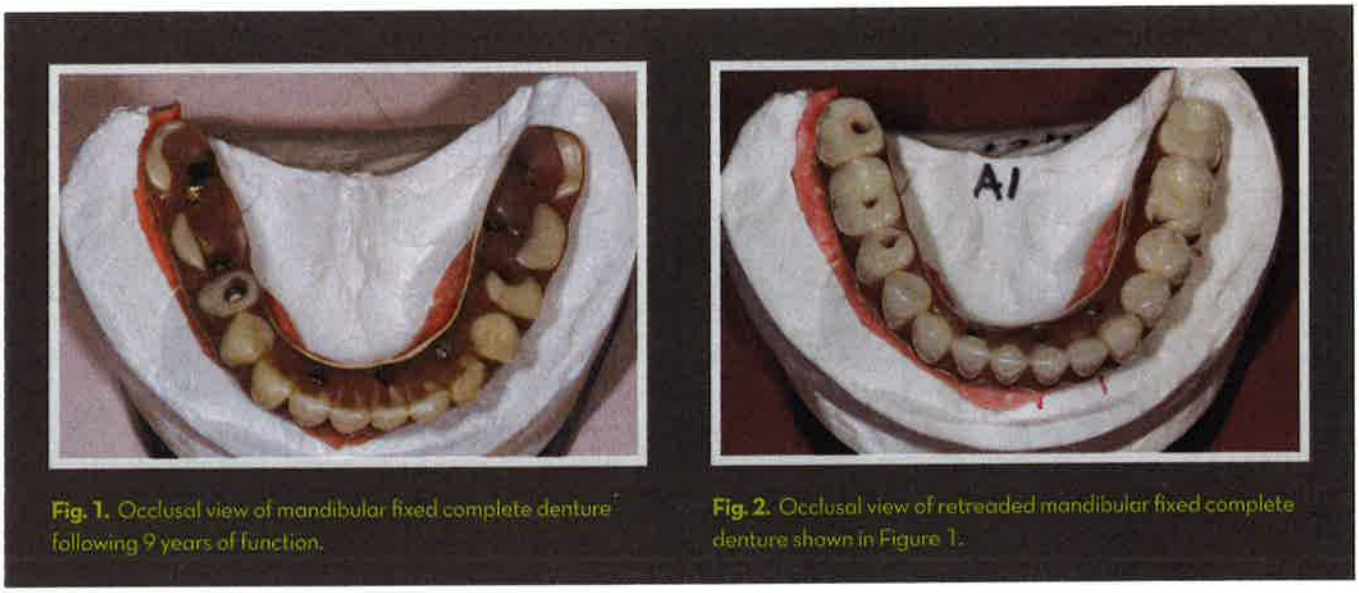

Fig. 1. Occlusal view of mandibular fixed complete denture following 9 years of function.

Fig. 2. Occlusal view of retreaded mandibular fixed complete denture shown in Figure 1.

Screw-retained complete-arch dental implant rehabilitations have existed as a treatment option for the completely edentulous patient for over 50 years. From the beginning, Professor Per-Ingvar Brånemark restored his patients with a fixed complete denture. This prosthesis consisted of manufacturer's denture teeth processed to a cast metal framework with acrylic resin. In today's marketplace, there are many different options for restoring a complete-arch of dental implants, including various ceramic materials. However, with the All-on-4® treatment concept becoming so popular over the last few years as an economic and convenient solution, the screw-retained acrylic-veneered fixed complete denture continues to be one of the more popular solutions as a definitive prosthesis.

While the implant-supported acrylic-veneered fixed complete denture is a good option for the completely edentulous patient, it does require maintenance and can also experience prosthetic complications. Denture tooth fracture and/or debonding from the acrylic resin base are probably the most common complications experienced with these restorations. Patients who function with an implant-supported acrylic fixed complete denture will experience occlusal wear to the denture teeth over time. This is a built-in buffer to a rigid system that works quite favorably from a biomechanics standpoint. However, as the teeth wear, patients experience alteration of their occlusion (bite), guidance in excursive or side-to-side jaw movements, and the loss of occlusal vertical dimension.

The dental laboratory process to replace the worn teeth and acrylic resin base is called a "retread". In a manuscript authored by Balshi et al and accepted for publication in the *International Journal of Prosthodontics*, a retread is defined as, "the removal of worn veneering material on an implant-supported framework followed by the replacement of new veneering material at a desired vertical dimension of occlusion on the same implant-supported framework." After studying 205 arches, the authors reported that it takes an average of seven years for the patient to wear down acrylic denture teeth to the point at which they need replacement. An example of a worn implant-supported fixed complete denture is illustrated in Figure 1. The same framework after the retread procedure in the dental laboratory is shown in Figure 2.

Recent innovations in digital dentistry have modified procedures associated with the fixed complete denture. The same retread procedure that we've been performing for years can now also be done as a fully milled acrylic resin veneer where there are no individual denture teeth. This is a "game-changer" for the fixed complete denture because it could dramatically reduce the number of prosthetic complications that are seen with this type of restoration.

Fig. 3a. Virtual tooth design for retreaded prosthesis from an occlusal view.

Fig. 3b. Virtual tooth design for retreaded prosthesis from a frontal view.

Fig. 3c. Virtual tooth design for retreaded prosthesis from a posterior view.

Once the desired vertical dimension of occlusion is established, it is optically scanned and a new digital tooth arrangement is made (Figures 3a-c). The technology can be applied to frameworks that are "wrap-around" style (Figure 4a-b) or cases that have polished metal on the intaglio (tissue) and/or lingual surfaces (Figure 5a-b). Early unpublished results show a complication rate less than one percent.

It is expected that the fully milled resin veneer will wear at the same rate or even a little slower than manufacturer's denture teeth. In other words, the biomechanical "buffer" that exists with a traditional fixed complete denture still exists with the fully milled acrylic resin denture. A digital record of the case is stored when the next retread procedure is needed in the future.

It is prudent for the clinicians to discuss wear factors and future need for retread procedures with patients at the initiation of implant prosthodontic treatment. It would be beneficial for this information to be included in the written informed consent for treatment. This patient education prior to treatment will inevitably avoid surprises and confrontations between the patient and the practitioner when retreads are required. ■

Fig. 4a. Fully milled retreaded titanium framework from an occlusal view.

Fig. 4b. Fully milled retreaded titanium framework from an intaglio view.

Fig. 5a. Fully milled retreaded cast gold framework with a polished intaglio surface from an occlusal view.

Fig. 5b. Fully milled retreaded cast gold framework with a polished intaglio surface from an intaglio view.