Fixed and Removable Implant Restorations: A Solution for Every Arch

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When a patient presents with an edentulous arch or terminal dentition, implant treatment can be provided that improves not only form and function, but also quality of life. For patients desiring better chewing capability, stability, esthetics and comfort than a traditional denture can offer, both removable and fixed implant restorations are superior alternatives. While the appropriate implant solution can vary depending on the patient’s oral health, anatomy, quality and quantity of bone, and financial resources, full-arch prosthetics have progressed to the point where virtually every patient can be restored. Although fixed, implant-supported restorations offer the highest levels of stability, function and patient satisfaction, removable overdentures are a dramatic improvement over conventional complete dentures as well. Both treatment options effectively mitigate the bone resorption that occurs following the loss of teeth, helping to preserve the oral and facial structures and, by extension, the self-confidence of the fully edentulous patient. Determining which solution is appropriate requires a careful evaluation of the individual patient’s circumstances and desires. Even when an implant overdenture is delivered, the prosthesis can eventually be converted to a fixed restoration. As evidenced by the case that follows, in which one arch is restored with an implant overdenture and the other with a BruxZir® Full-Arch Implant Prosthesis, practitioners today have a great deal of clinical flexibility. Whatever prosthodontic approach is adopted, immediate, life-changing relief can be provided to patients suffering from terminal dentition or an uncomfortable, poorly functioning traditional denture. Further, the dramatic overhaul of this patient’s oral health demonstrates the life-changing capabilities of implant therapy, which helped him overcome severe functional and esthetic challenges that were impacting practically every facet of his life prior to treatment.

Case Presentation

A 47-year-old male presented with terminal dentition in both arches resulting from periodontal disease and severe caries (Figs. 1a–1c). The patient had already lost many of his teeth, and the dentition that remained had been rendered unstable by his periodontal condition (Fig. 2). He had saved up enough money for a fixed implant restoration for his upper arch, for which he desired the most functional, lifelike prosthesis possible. While he couldn’t afford such a restoration for both arches, he wanted a retentive appliance for his mandible, with the option of later upgrading to a fixed prosthesis. The patient accepted a treatment plan in which his maxilla would be restored with a BruxZir Full-Arch Implant Prosthesis and his mandible with an Inclusive® Locator Implant Overdenture. Fabricating his maxillary restoration from monolithic zirconia would ensure maximum long-term durability. This was important provided the relatively young age of the patient, who would not have to worry about his upper prosthesis succumbing to fractures, chips or stains. His lower appliance would be held in place by connecting to the implants via Locator® attachments (Zest Anchors, Escondido, Calif.), which are an economical means of improving prosthetic retention and stability. The overdentures that connect to the Locator attachments would be incorporated in the prosthesis chairside, though it should be noted that many clinicians elect to have the laboratory handle this step. The surgical phase of treatment called for the extraction of the patient’s remaining teeth followed by

Figures 1a–1c: Preoperative condition of the patient. Note the high lip line, severe cervical decay present on the patient’s remaining teeth, and lack of gingival support.

Figures 2–5: Preoperative panoramic X-ray exhibits periodontal disease, cervical caries, terminal state of the patient’s dentition, and the compromised state of the surrounding periodontium, which had rendered the teeth mobile.

Figures 6–9: Traditional dentures were fabricated in advance of the surgical appointment so they could be immediately converted to serve as temporary appliances during the healing phase.

Figures 7a, 7b: Same-day conversion of the maxillary denture to an immediate fixed prosthesis was achieved by adding multi-unit temporary cylinders using cold-cure acrylic and trimming the appliance into a horseshoe shape.

Figures 8a, 8b: Note the dramatic change in the appearance of the patient, who left with chairside-converted dentures in place on the same day as surgery, including a screw-retained, fixed provisional for his upper arch.
the immediate placement of eight dental implants. CBCT scans were taken to help determine the optimal placement of the implants within the available bone and away from the patient’s vital oral anatomy. Evaluation of the CBCT scan determined that there was sufficient height, width and quality of bone to place the implants in the appropriate locations and angulations via freehand surgery. Four 3 mm Inclusive® Tapered Implants (Glidewell Direct, Irvine, Calif.) would be placed in each arch to support the fixed maxillary and the removable mandibular prosthesis.

At the surgical appointment, the patient’s remaining teeth were removed, and a flap was raised to visualize the socket sites and areas of implantation. Bone leveling was performed on the patient’s maxillary arch to elevate the patient’s smile transition line above the upper lip. The maxillary osteotomies were positioned to facilitate an All-on-4 configuration, with the posterior implants tilted to maximize the anterior-posterior (AP) spread, avoid the sinus, and accommodate the patient’s bone limitations (Fig. 3). Osseotomes were created for the placement of four mandibular Locator overdenture implants, as opposed to the minimum of two required for a locator overdenture. This would enhance retention of the overdenture while allowing the possibility of upgrading to a fixed restoration at a later time. Following creation of the osteotomies, the implants were placed (Figs. 4a–4f). Inclusive® Multilink Abutments (Glidewell Direct) were attached to the maxillary implants, correcting for the divergent angulation of the implants. This would both position the restorative platform in a manner that would situate the screw access holes of the eventual prosthesis toward the lingual aspect and allow for a molar-to-molar restoration.

Note that when patients present for treatment with terminal dentition, they are commonly anxious about losing their teeth and the effect this will have on their speech and chewing capabilities. For this reason, it is important to make every effort to ensure that the patient leaves with functional appliances in place. Thus, traditional dentures were fabricated from preliminary impressions in advance of the surgical appointment for modification and delivery following placement of the implants (Fig. 6). Having achieved sufficient primary stability, the Inclusive® Tapered Implants placed in the patient’s maxilla could be immediately loaded. Thus, the upper denture was trimmed and modified, and the soft tissue allowed to seal over the implants in an osseointegration process. Healing abutments were placed in the mandibular implants to begin developing the transmucosal passages. The lower immediate denture was then trimmed and relined to seat over the implants during healing. This approach provided the patient with same-day temporary restorations, and he walked out of the office with properly functioning teeth for the first time in many years. The effect this had on the patient’s comfort, function and appearance was immediate and profound (Figs. 8a, 8b). The final radiograph taken after seating the temporary appliances confirmed excellent positioning of the implants (Fig. 9).

At the following appointment, the wax rims were removed, and the efficiency of the design was confirmed. A second set of occlusal and facial photographs were taken (Figs. 10a, 10b). The patient returned after three and a half months of healing so the stability of the implants and health of the soft tissue could be evaluated. Removal of the temporary appliance revealed excellent tissue health around the healing abutments of the mandible and multi-unit abutments of the maxilla (Figs. 10a, 10b). Vinyl polysiloxane (VPS) impressions were taken to begin the restorative process (Figs. 11a–11c). Because multi-unit abutments and healing abutments were placed on the day of surgery, the restorative process began above the tissue level, without any need for secondary surgery or anesthesia.

The restorative protocol for both prosthesis included wax rims and setups, which the lab produced on the working casts fabricated from the impressions (Figs. 12a, 12b). The maxillary wax rim incorporated temporary cylinders through which screws could connect to the dental implants. The lower wax rim was designed to seat over Locator impression caps. The jaw relationship was recorded and a bite registration (Fig. 6) was produced based on the final impression. A new master cast of the maxilla containing the verification jig, screw access holes were created in precise alignment with the positions of the maxillary implants.

The CAD design was used to mill a provisional implant prosthesis from polyethylene methacrylate (PMMA) (Figs. 20a, 20b). This appliance was tried in and worn for a trial period, thus ensuring an accurate prosthetic design. The provisional implant prosthesis was an essential element of the restorative process, as significant adjustments cannot be made to the final restoration once it has been milled from BruxZir Solid Zirconia.

At the following appointment, the Inclusive® Locator overdenture was seated and checked for proper fit, function and support from the soft tissue. Then the provisional implant prosthesis was screwed into place, and its teeth positioned. Function and esthetics were verified (Figs. 21a, 21b). With both appliances in place, the intraoral impression was made to serve as the basis for the working cast the laboratory would use to begin designing the restoration. Note that a closed bite impression was taken for the lower implant overdenture.

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relationship was checked (Figs 21a, 21b). Minor occlusal adjustments were made directly to the maxillary provisional implant prosthesis, as PMMA is easily modified. Slight alterations were also made to the lower implant overdenture. Then, blockout slabs and the retentive overdenture caps were seated over the Locator attachments (Figs 23a, 23b). Quick Up self-cure material (VOCO America; Indian Land, S.C.) was added to the recess wells of the overdenture before seating the appliance over the metal housings. After letting the material set for approximately three minutes, the overdenture was removed, picking up the denture caps in the prosthetic seating. The minor voids surrounding the denture caps were then filled with Quick Up light-cured pink composite material (Fig. 25). The implant overdenture was reseated, providing excellent retention, stability and function for the patient. With the final mandibular restoration in place, the patient wore the provisional full-arch implant prosthesis for a trial period of two weeks (Fig. 26) to verify the appliance before fabricating the definitive prosthesis. The final BruxZir Full-Arch Implant Prosthesis was digitally fabricated with precision (Fig. 27). As an exact reproduction of the try-in/try-on prosthesis, the definitive prosthesis fit perfectly and offered the esthetics and function the patient had come to expect (Figs 28a, 28b). The final restoration effectively addressed the unique circumstances of the case, providing the most durable, stable prosthesis possible for his upper, and a lower restoration that greatly improves prosthetic retention and can be upgraded to a fixed prosthesis should the patient’s situation change.

Conclusion
Practitioners now have the clinical flexibility to offer patients a wide range of treatment options, from entry-level, economical restorations like the Inclusive Locator Implant Overdenture, to the highly durable BruxZir Full-Arch Implant Prosthesis. There is a viable means of treating nearly all patients, whatever their oral health, needs and finances. Provided the life-changing benefits of implant therapy and the straightforward conservative protocols of today, this service should be offered to all patients confronting the challenges presented by complete edentulism.

References