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 prosthetic 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, lifetime 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 mandibular overdenture would be a dramatic improvement over the traditional denture. Further, 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.

Figures 6a–6c: 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.

Figure 7: Maxillary implants with parallel pins in place exhibit the axial placement of the anterior implants and the tilted angulation of the posterior implants.

Figure 8: 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 9a, 9b: 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 10a–10c: Postoperative panoramic radiograph illustrates All-on-4 configuration of maxillary implants and axial placement of the mandibular implants, which would facilitate a passive fit of the lower overdenture. Note the temporary cylinders attaching the provisional maxillary denture to the implants.
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. Forty mm Inclusive® Tapered Implants (Glidewell Direct, Irvine, Calif) would be placed in each arch to support the fixed maxillary restoration 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 (A-P) spread, avoid the sinuses, and accommodate the patient’s bone limitations (Fig. 3). Osteotomies were created for the placement of four mandibular implants, as opposed to the minimum of two required for a Locator overdenture. This would enhance retention of the prosthesis and allow for a more stable support for the mandible.

Implants were placed in the patient’s 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, with no need for secondary surgery or anesthesia. The restorative protocol for both prostheses included wax rims and setups, which the lab produced on the master cast of the maxilla (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 using CAD software (Figs. 13a, 13b). A new master cast of the maxilla was designed using CAD software (Figs. 14a, 14b). A new master cast of the mandible and multi-unit abutments were placed in the mandible (Figs. 15a, 15b, 15c). The custom tray provided access holes of the eventual prosthesis, the implant verification jig was attached to the implants so a precise temporary implant prosthesis. These extra measures were taken to make absolutely certain that the definitive prosthetic design was accurate before milling the final restoration from monolithic zirconia.

The implant verification jig was attached to the implants so a precise final impression could be taken (Figs. 17a–17c). The custom tray provided access holes of the eventual prosthesis, and seated the jaw relation. Interocclusal relationship was verified (Figs. 21a, 21b). With both appliances in place, the interocclusal prosthesis was accurately verified (Figs. 21a, 21b). The varus position of the jaw relationship was recorded and a bite registration taken. The case was returned to the lab, and the impression ports were modified and relined to seat over the Loca-

denture technique.
relationship was checked (Figs. 22a, 22b). 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 shims 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 process. The minor voids surrounding the denture caps were filled in the minor voids between the denture caps and metal base of the prosthesis. NOTE: In many cases, the doctor elects to have the overdenture caps processed by the lab.

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). This opportunity to wear the appliance during actual day-to-day function installed a high degree of confidence in the prosthetic design for the patient and doctor alike. Following patient approval, the provisional implant prosthesis was returned to the lab so it could serve as the blueprint for the final restoration and the minor adjustments made to the appliance could be included in the definitive prosthetic design. The final BruxZir Full-Arch Implant Prosthesis was digitally fabricated with precision (Fig. 27). As an exact reproduction of the test-driven prosthesis, the definitive prosthesis fits perfectly and offered the esthetics and function the patient had come to expect (Figs 24a, 24b). 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 fixed, highly retentive 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 restorative protocols of today, this service should be offered to all patients confronting the challenges presented by complete edentulism.

References
