Complete reconstruction for a patient with chronic tooth decay
The damage undone

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When oral health is neglected for extensive periods of time, dental conditions like tooth decay and periodontal disease can advance to a point that, prior to the advent of implant therapy, was considered hopeless. If a patient presented with extensive caries and a non-restorable set of dentition, practitioners had no choice but to extract the teeth and provide the patient with a complete denture. Although beneficial to patients as a fundamental replacement of their teeth, many patients have found the fit, comfort and retention of such appliances to be problematic. Without any anchorage to hold it in place, the traditional denture has a tendency to move around in the patient’s mouth, compromising speech and chewing capabilities. This problem is exacerbated by the recession of the edentulous arch that occurs following tooth loss or extraction. After decades of advancements in implant design, restorative materials, and dental dentistry, we can today provide patients with a higher level of care. Root form dental implants can be placed predictably to hold a full-arch prosthesis in place, providing the patient with comfort, function, and quality of life compared to traditional complete dentures. Further, osseointegration enables the precision of digital diagnostics and CAD/CAM fabrication to achieve a predictable, aesthetic restoration for a case that would seem hopeless to many. The case illustrates how implant therapy can afford patients even in the most extreme of dental circumstances an excellent long-term prognosis, restoring not just the teeth, but also the bone, soft tissue, self-esteem, and quality of life.

A treatment plan is developed that harnesses the classic principles of implant placement, the versatility of modern restorative materials, and the precision of digital diagnostics and CAD/CAM fabrication to achieve a predictable, aesthetic restoration for a case that would seem hopeless to many. The case illustrates how implant therapy can afford patients even in the most extreme of dental circumstances an excellent long-term prognosis, restoring not just the teeth, but also the bone, soft tissue, self-esteem, and quality of life.

Thus, patients who present with the most acute dental conditions can now be brought back from the brink. Some teeth can be saved, they can be extracted, implants are placed, and a full-arch restoration is delivered that closely emulates the form and function of natural dentition. This alternative should be presented to all patients for whom implant therapy is indicated, as individuals who at first may not appear to have the means for high-quality treatment may in fact have the wherewithal after being apprised of their options. Additionally, all patients should be made fully aware of the long-term costs and benefits of traditional complete dentures vs implant-supported restorations before making a decision with such life-changing potential. The presentation that follows documents a case in which a patient with severely decayed dentition underwent a complete oral reconstruction.

20 years ago, the patient was recovering from an addiction to methamphetamine, which had caused ex- ceptional dental and periodontal deterioration and resulted in substantial damage to the patient’s teeth. Initially, a comprehensive treatment plan was developed. It was explained to the patient that his natural teeth could not be saved and a full range of treatment alternatives was presented, from complete dentures to fixed full-arch implant restorations. Before-and-after photos of similar cases were shown to the patient to assist his evaluation of the restorative options. The patient chose full-arch reconstruction consisting of fixed prostheses delivered over dental implants. A treatment plan was developed that included extraction of the patient’s non-restorable dentition, the placement of eight implants in each arch, delivery of Inclusive® Titanium Custom Abutments and BioTemps® restorations (Glidewell Europe GmbH; Frankfurt/Main, Germany), and final restoration with fixed PFM prostheses. The latest tools in digital dentistry were utilized to maximize the precision of both implant placement and prosthesis fabrication.

Because of the patient’s relatively youthful age and his continued brushing habits, eight implants were placed with the potential for optimal aesthetics. Although BruxZir® Zirconia Full-Arch Implant Posts (Glidewell Europe GmbH; Frankfurt/Main, Germany) would have been the ideal restorations given the need for long-term durability in this case, the product was not yet available at the time of treatment. Thus, PFM prostheses were chosen in order to avoid acrylic and its susceptibility to staining, wear and fracture. The proposed PFM restorations included layered pink porcelain to recreate the patient’s natural gingival contours. All aspects of treatment were explained to and accepted by the patient. The treatment was completed in five phases. The CBCT scan confirmed that the grafting procedure to create the foundation for the maxillary and mandibular ridges necessitated a grafting procedure to create the foundation for the maxillary and mandibular ridges. The grafting procedure was successful in increasing the bone volume available to accommodate the planned implants. The CBCT scanning data was used to derive a virtual intra-arch implant plan that would place the eight implants for each edentulous ridge in the maximum amount of bone adhering to the key implant positions as taught by Dr Carl Misch. Surgical harvesting confirmed the bone volume available to accommodate the planned implants. The CBCT scanning data was used to derive a virtual intra-arch implant plan that would place the eight implants for each edentulous ridge in the maximum amount of bone adhering to the key implant positions as taught by Dr Carl Misch. Surgical
Carestream Dental makes it easy for you to elevate your practice above the rest with the CS 3600 intraoral scanner. High-speed continuous scanning captures dual arches quickly and easily, while full HD 3D scans simplify communication with patients, referrals and labs. With open system files and no hidden click fees, Carestream Dental has designed the CS 3600 to rise to the challenge of making digital impressions fast, accurate, easy and open.

guides were fabricated to ensure placement of the implants in the precise positions called for by the treatment plan (Figs. 5a & b).

At the next appointment, the tissue-supported surgical guides were tried in and found to be well-fitting. The fixation pins of each surgical guide were tightened with a surgical index in place to ensure complete, secure seating of the appliances (Fig. 6). A tissue punch was used to provide access to the implant sites, facilitating a flapless surgical procedure that would minimize gingival trauma. The osteotomies were created through metal inserts placed in the surgical guides, which precisely controlled drilling-depth and orientation according to the digital treatment plan (Fig. 7).

Eight BioHorizons® Laser-Lok® dental implants (BioHorizons, Birmingham, USA) were placed in each ridge, including 7 mm implants in the two distalmost locations of each arch, and 4.5 mm implants in the remaining sites. After placing healing abutments in the implants, a soft retractor was positioned to help determine the initial design for the definitive prostheses before the final prosthetic designs could be determined (Fig. 8).

Using Take® Advanced™ polyvinylsiloxane material (Kerr Corp.; Orange, USA) to fabricate a diagnostic wax-up, the lab digitally produced the custom abutments and verified the design on the soft-tissue models (Fig. 11).

The lab poured working casts from the VPS impressions of the patient’s edentulous arches and produced wax occlusal rims (Fig. 12). After seating the wax rims in the patient’s mouth and tightening the temporary cylinder screws, the jaw relationship records were taken (Fig. 13). Note that the patient’s vertical dimension had virtually collapsed due to the extensive wear to his teeth. After measuring the distance between the patient’s nose and chin during maximum intercuspation, the lab was instructed to open the patient’s bite by 2 mm. Next, the lab used CAD software to design Inclusive® Titanium Custom Abutments (GlideWell Europe GmbH; Frankfurt/Main, Germany) for both arches based on the scanned working models. The CAD/CAM-produced custom abutments were seated on the working models so their fit could be verified and they could be used in the development of the definitive prostheses (Figs. 14a & b). Based on the jaw relationship records and the impressions of the patient’s immediate dentures, the lab prepared a diagnostic wax-up to help determine the initial design for the PFM restorations (Fig. 15). After stabilizing the initial design, BioTemp prostheses were fabricated from poly methyl methacrylate (PMMA) material, which is versatile enough to easily accommodate adjustments at the try-in appointment, yet durable enough for provisionalization (Fig. 16). The working models were sent out along with the custom abutments and BioTemp interim restorations for patient evaluation (Fig. 17). The patient returned to the lab along with the titanium custom abutments transferred to the patient’s mouth using the acrylic delivery jig provided by the lab (Fig. 18). The custom abutments achieved a precise fit and were thus tightened to the appropriate torque, establishing ideal soft-tissue margins and support. Complete seating was verified radiographically, and the screw access holes were covered.

Next, the BioTemp prostheses were tried in and exhibited an accurate fit (Figs. 19a & b). The provisional restorations were returned to the lab along with the temporary cement and the phonetics, aesthetics, bite and function evaluation (Fig. 19a). Minor modifications were made to the BioTemp prostheses, and the patient wore the BioTemp provisional(s) for an interim of four weeks. This trial period was essential in verifying that the patient was happy with the look, comfort and function of the prosthetic designs before the final PFM restorations were fabricated. After patient approval was provided, alginate impressions were made of the BioTemp prostheses. Models of the final approved BioTemp restorations were fabricated from the impressions, and a new bite was taken so the definitive prosthetic designs could be adjusted accordingly. Crown & bridge impressions were taken of the final custom abutments in place and would be used by the lab to pour master models, upon which the final PFM restorations would be produced. The gingival areas for the final PFM restorations were marked onto the models of the BioTemp restorations, and the case was returned to the lab along with radiographs, which confirmed their accuracy. The final prostheses were fabricated by layering porcelain over a cast metal framework. Porcelain was layered on to form the gingival areas according to the markings indicated on the models of the BioTemp restorations, thus replacing portions of the soft tissue as the teeth per Dr. Misch’s PFS (Fixed-Prosthesis System) principles of prosthetic design. Because the final prostheses were designed using the models fabricated from the final crown and bridge impressions, a precise fit over the patient’s custom abutments was ensured (Fig. 20).

At the delivery appointment, the PFM restorations were delivered over the custom abutments without issue. A panoramic radiograph was taken to confirm complete seating (Fig. 21). The final prostheses achieved the exact fit, aesthetics and function that the patient had come to expect after six weeks of wearing the BioTemp provisional(s), which ultimately served as the bases for the final restorations (Figs. 22a–c).

The patient was ecstatic with the results, which reconstructed his teeth and gingiva, along with his confidence and quality of life. A night guard was produced for the patient to mitigate the impact of his parafunctional habits (Fig. 23).

Conclusion

The predictability of implant treatment and the adaptability of restorative materials enable clinicians to provide patients in the most dire of dental circumstances a complete overall treatment. The predictability of implant therapy expands ever further, so does the patient population that is able to receive high-quality treatment. The predictability of implant treatment and the adaptability of restorative materials enable clinicians to provide patients in the most dire of dental circumstances a complete overall treatment. The predictability of implant therapy expands ever further, so does the patient population that is able to receive high-quality treatment.

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