Complete reconstruction for a patient with chronic tooth decay

The damage undone

By Dr Ava Nazarian, USA

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 not favorably set 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 advances in implant design, restorative materials, and digital 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 an anchor, comfort, function, and quality of life compared to traditional complete dentures. Furthermore, osseointegrated implants serve to mitigate bone resorption. This means that in the long term, the bone density and the advantages of natural dentition, implant-supported restorations also help to preserve the edentulous ridge and the essential support it provides for the mouth and face. The positive impact this can have on personal confidence, emotional health, and social interactions is substantial. Thus, patients who present with the most acute dental conditions can now be brought back from the brink. Even some who had previously undergone via implant therapy. If the patient’s teeth have deteriorated to the point where they were deemed non-restorable, 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 versus 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 reconditioning.

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.

Case Report

A 56-year-old male patient presented for treatment with advanced, extensive caries and localized periodontal disease (Figs. 1a–c) in addition to not having seen a dentist in more than 20 years. The patient was recovering from an addiction to methamphetamine, which had caused extreme dental caries and gingival that had substantially worn down the patient’s teeth. The many years of dental neglect combined with these parafunctional habits to render the patient’s severely decayed dentition unrestorable (Fig. 2). Further, the deterioration of the patient’s teeth was accompanied by significant soft-tissue recession and bone resorption.

Although the patient had been quite apprehensive about seeking treatment, pain and discomfort eventually compelled him to take action. The patient had sought treatment from a practice where he could receive all of the necessary treatment from a single provider in the earliest appointments possible. After locating my practice, the patient found the courage to present for evaluation. It was apparent from the initial visit that he was ashamed of his condition.

The goal was to offer him the best treatment available in order to restore the patient’s smile, form and function. Without presuming the appropriate standard of care for the patient based on his condition, 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 reconstructions consisting of fixed prostheses delivered over dental implants. A treatment plan was developed that included extractions of the patient’s non-restorable dentition, the placement of eight implants in each arch, delivery of Inclusive® Titanium Crowns and a full arch prosthesis. All aspects of treatment were explained to and accepted by the patient. The first phase of treatment began by surgically extracting the patient’s teeth, which were then sent for BruxZir® Solid Zirconia Full-Arch Implant Restorations (Gibedelux 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 porcelains to recreate the patient’s natural gingival contours. All aspects of treatment were explained to and accepted by the patient. The first phase of treatment began by surgically extracting the patient’s teeth, which were then sent for BruxZir® Solid Zirconia Full-Arch Implant Restorations (Gibedelux Europe GmbH, Frankfurt/Main, Germany) and final restoration with fixed PFM prosthesis. The latest tools in digital dentistry would be utilized to maximize the precision of both implant placement and prosthetic fabrication. Because of the patient’s relatively youthful age and his continued bruxing habit, eight implants were proposed for each arch in order to maximize the distribution of occlusal load, the preservation of his ridges, and the long-term prognosis of the patient’s maxillary and mandibular ridges necessitated a grafting procedure. The proposed procedures and treatment plan needed for implant placement. Custom abutments would be used to position the prostheses for optimal aesthetics. Although BruxZir® Solid Zirconia Full-Arch Implant Restorations (Gibedelux 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 porcelains to recreate the patient’s natural gingival contours. All aspects of treatment were explained to and accepted by the patient. The first phase of treatment began by surgically extracting the patient’s teeth, which were then sent for BruxZir® Solid Zirconia Full-Arch Implant Restorations (Gibedelux Europe GmbH, Frankfurt/Main, Germany) and final restoration with fixed PFM prosthesis. The latest tools in digital dentistry would be utilized to maximize the precision of both implant placement and prosthetic fabrication.
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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 tightening pins of each surgical guide 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 minimise 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 5.7 mm implants in the two distalmost locations of each ridge, and 4.5 mm implants in the remaining sites. After placing healing abutments in the implants, a soft re-line was performed on the patient’s temporary dentures so they could continue to serve as interim prostheses for the duration of healing and osseointegration. Four months after surgery, the patient returned to the office so impressions could be taken. Removal of the healing abutments revealed optimal tissue health surrounding the implant sites (Figs. 8a & b). Transfer posts were seated to capture the position of the implants (Fig. 9). Closed tray impressions were taken of the upper and lower arches using Take 3® Advanced™ vinyl poly-siloxane material (Kerr Corp., Orange, USA; Figs. 10a & b). At the same appointment, thermoformed suck-down impressions were made and a bite registration taken with the patient’s immediate dentures in place, providing the lab with a template for the definitive design of the PFM restorations (Fig. 11).

The lab posted 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 mouth using the acrylic wax occlusal rims (Fig. 14) 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. 15a & b). The provisional restorations were attached to the abutments using temporary cement, and the phonetics, aesthetics, bite and function were evaluated (Fig. 16). Minor modifications were made to the BioTemp prostheses, and the patient wore the BioTemp provisional until the final prostheses 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 design 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 prostheses would be produced. The gingival areas for the final PFM prostheses were marked onto the models of the BioTemp restorations, and the case was returned to the lab along with final adjusted provisional FPM prostheses fabricated using temporary cement, and the patient’s nose and chin during maximum intercuspation, establishing ideal soft tissue margins and support. Complete seating was verified radiographically, and the screw access holes were covered.

At the final 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, 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 confident and quality of life. A nightguard 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 overhauling, reversing the damage that can result from many years of dental wear and neglect. This goes beyond the restoration of oral function by preserving the facial aesthetics that are so fundamental to the emotional state and social life of the patient. Provided its life-changing capacity, the fixed full-arch implant restoration should be offered to all patients who present with unremitting den- tition, without prejudicing a patient’s situation and the form of treatment that they will ultimately accept. As the precision, cost-effectiveness and prosthetic versatility of implant therapy expands ever further, so does the patient population that is able to receive high-quality treatment.

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