

Teeth in a Day for the Maxilla and Mandible: Case Report

Thomas J. Balshi, DDS, FACP* Glenn J. Wolfinger, DMD, FACP**

Abstract

Background: A growing body of evidence indicates that successful osseointegration of dental implants can take place in the wake of immediate loading, providing that bone quality and quantity are adequate, and patients follow postsurgical instructions carefully.

Purpose: The goal of this report is to demonstrate the efficient treatment protocol based on immediate loading for both the maxilla and mandible, including extraction site locations.

Methods: Following extraction of the remaining anterior mandibular teeth, 18 Branemark implants (Nobel Biocare, Gothenburg, Sweden), including two zygoma and two pterygoid implants, were installed in both arches in accordance with the Teeth-in-a-Day protocol developed by the authors nine years ago. This protocol uses an acrylic screw retained prosthesis, with steel prosthetic copings embedded, supported by full-size Branemark implants to prevent micromotion at the bone-to-implant interface

Results: Only one of the 18 immediately loaded implants failed to osseointegrate. Three years after completion of treatment, the patient reported functioning well with no complications.

Conclusion: When appropriate subjects are selected, the Teeth in a Day protocol offers patients a number of significant advantages, including condensed treatment time, reduced post-surgical discomfort, and almost instantaneous improvement in speech and masticatory function, esthetics, and patient self-image.

KEY WORDS: Immediate loading, Conversion prosthesis, Full-arch reconstruction, Zygoma implants, Pterygoid implants, Teeth In A Day™

The traditional two-stage implant protocol with delayed loading achieved excellent long-term results¹ but also demanded a great deal from patients. They had to tolerate treatment that in some instances approached two years in duration. They had to be willing to function for extended periods without any teeth at all, or if they did wear a removable appliance during the post-surgical recovery period, they usually experienced significant discomfort. Because of the need for frequent follow-up visits over the course of treatment, most patients had to rely upon whatever level of dental expertise was close to their homes.

As early as the 1970s, a handful of researchers began demonstrating the possibility of utilizing more condensed, one-stage treatment procedures^{2,3}. By the late

1980s and early 1990s, a small body of scientific papers began to document successes achieved by utilizing not only one-stage but also immediately loaded protocols^{4,5}. In 1993, the authors initiated a study in which they placed 40 immediately loaded Branemark implants in conjunction with 90 unloaded implants in 10 edentulous mandibles. Acrylic fixed transitional implant-supported prostheses were used for the immediate loading. Although eight of the 40 loaded implants were lost, all patients successfully retained their prostheses⁶.

On-going scientific reports from various clinicians have continued to make it clear that early and immediate loading can safely be accomplished in all areas of the mouth⁷⁻¹⁵, providing that bone quality is sufficient to ensure initial stability and patients scrupulously follow post-surgical instructions. Clinicians who load implants immediately also must be skilled and adequately trained, and a reliable protocol must be utilized.

This paper presents a surgical and prosthetic protocol developed by the authors nine years ago and subsequently refined by them. It also describes the use of this

* Institute for Facial Esthetics, Fort Washington, PA, USA

Reprint requests: Thomas J. Balshi, DDS, 467 Pennsylvania Avenue, Suite 201, Fort Washington, PA 19034, USA; email: PITEAM@aol.com

protocol in treating a long-distance patient who previously had rejected treatment with implants because of the demanding therapeutic requirements and negative aesthetic consequence that a traditional two-stage approach would have entailed.

The Protocol

The Teeth in a Day protocol begins with fabrication of a custom provisional restoration by the prosthodontist and his dental laboratory team. On the day of surgery, osteotomies are created and the quality and quantity of bone are assessed as the implants are placed. Abutments are then positioned and tightened with an electronic torque-control device.

After the soft-tissue flaps are approximated lightly against the abutments, the prosthodontist uses long prosthetic guide pins or gold prosthetic screws to connect modified steel impression copings to the abutments. He then applies transfer ink to the top of the guide pins or screws and positions a rubber dam over them. This procedure records the position of the implants. At each position, a punch is used to create a hole in the rubber dam. The rubber is eased over each impression coping, taking care to avoid creating any folds or wrinkles.

Next a syringe is used to apply acrylic resin around the prosthetic cylinders. The internal surface of the hollowed-out acrylic prosthesis is lined with freshly mixed resin material. To maintain the proper vertical dimension of occlusion, all denture-bearing areas are protected from any contact with the newly applied acrylic.

The prosthesis is placed in the mouth of the patient, who refrains from movement for approximately 4 minutes while the teeth are held in the desired occlusal relationship. During this interval, the rubber dam protects the soft tissue and bone from the heat released as the acrylic polymerizes. The dam also protects any undercuts between the abutments from being engaged by the hardened acrylic.

Once removed from the mouth, the prosthetic teeth are sent to the laboratory for structural enhancement, refinement, and polishing. As this occurs, panoramic and cephalometric radiographs are taken to confirm the position of the implants in the patient's mouth. The finished prosthesis is then connected to the abutments using the small gold prosthetic screws, and the occlusal relations are evaluated and adjusted.

The patient is instructed in the importance of applying cold packs throughout the first 2 days after

surgery and advised to eat only soft foods and avoid putting any excessive pressure on the prosthesis for an additional 8 to 12 weeks.

After that healing period, a secondary impression is recorded, using the prosthesis as a stent. The patient returns soon afterward for delivery of the final metal-reinforced, custom-designed, tissue-integrated prosthesis.

Case Presentation: Immediately Loaded Maxillary and Mandibular Implant Restorations

The patient was a 55-year-old male from Florida who had been edentulous in the maxilla for nearly 40 years and was also missing teeth in the lower posterior. He had been informed elsewhere that implant treatment would require extensive maxillary grafting prior to implant placement, that he would be required to be without teeth for an extended period of time, and that the entire procedure would take up to 2 years. The patient rejected this plan because he felt that going without teeth would directly affect his work performance.

He had subsequently heard about this new protocol of immediately loading implants and he requested a consultation for treatment of his upper jaw with this new approach.

The patient arrived on a Monday morning. At the initial evaluation, diagnostic measures including panoramic and lateral cephalometric radiographs, a full-mouth series of intraoral radiographs, alginate impressions for diagnostic study casts, and photographs were made (Figure 1). Treatment options were then discussed.

The diagnosis included maxillary edentulism, mandibular partial edentulism, marginal breakdown beneath the remaining mandibular crown-and-bridge work, and periodontal disease (Figure 2). To fabricate an ideal maxillary reconstruction that would provide the patient with an optimal occlusal scheme, comprehensive treatment of the mandibular arch was recommended (Figure 3). Due to the patient's high anxiety level, the treatment plan also called for the use of general anesthesia.

The patient agreed to proceed with treatment, and nasal intubation was used to administer general anesthesia. As this was taking place, the laboratory began fabrication of custom acrylic dentures for both the maxillary and mandibular arches.

The surgical procedure involved extraction of the remaining mandibular anterior teeth, followed by placement of eight Branemark implants (Nobel Biocare



Figure 1 Preoperative full-face photo.

AB, Gothenburg Sweden). Ten implants were also placed in the maxilla. The latter included two maxillary zygomatic implants that engaged the zygoma bone superior to the sinus and thus provided posterior support for the maxillary prosthetic reconstruction. Use of the zygomatic implants eliminated the need for bone grafting in the maxillary sinus. Two of the other maxillary implants were placed posterior to the sinus, in the pterygoid area, to eliminate the potential for any cantilever effects in the maxillary arch.

Following placement of the implants, abutments were secured, and modified stainless steel screw-retained impression copings were attached to the abutments (Figure 4). Autopolymerizing acrylic resin was applied with a disposable plastic syringe to thoroughly coat all the prosthetic



Figure 2 Preoperative maxillary complete denture and mandibular partially edentulous arch. Note the recession showing the periodontal compromise of the remaining teeth.

components, along with the underside of the provisional dentures. The dentures were placed in the patient's mouth, and the occlusal/vertical dimension was confirmed. Once the resin hardened, the prosthesis was removed and taken to the laboratory for final adjustment and refinement. Postoperative panoramic and cephalometric radiographs confirmed the position of the implants, and the completed prostheses were attached to the abutments with gold screws. The entire procedure was accomplished within the four-hour time frame recommended for outpatient general anesthesia. The patient awoke with fixed teeth in the maxillary arch for the first time in nearly 40 years (Figure 5).

Postoperative medications included penicillin 500 mg (40 tabs, one tab QID to completion) and dexamethasone for swelling, as well as analgesics. The patient was also given portable ice bags and instructed to apply them to the area, 20 minutes on and 10 minutes off, for the next 48 hours to help control swelling. The patient returned to the office the following morning so that the occlusion could be assessed and adjusted. He left the office that afternoon for his flight home to Florida.

The patient followed up with a dentist near his home for suture removal and routine postoperative checks. Over the course of the next month or two, a few of the acrylic facings became displaced from the prosthesis. Although the patient had been instructed to consume only soft foods during the healing period, he admitted to chewing harder items and chipped the acrylic. However, the appearance of the missing facings did not bother the patient significantly.

He returned to our institute for the three-month follow-up, and a decision was made to proceed with completion



Figure 3 Preoperative panoramic radiograph illustrating missing teeth and periodontal disease on the remaining mandibular anterior teeth.

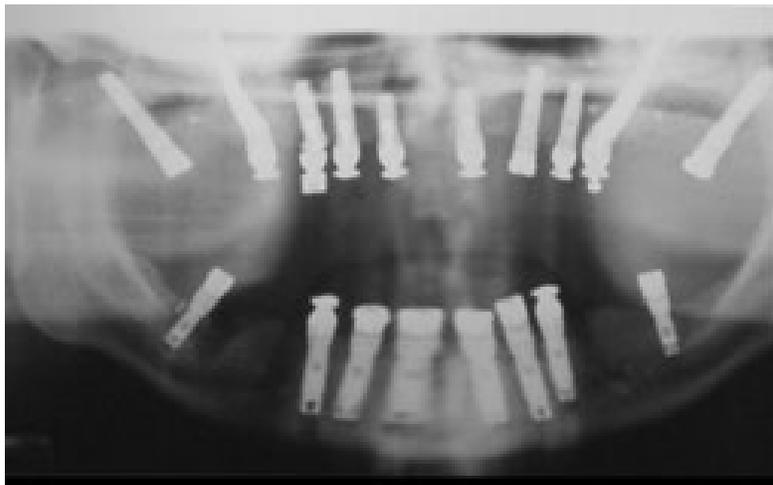


Figure 4 Post-surgical panoramic radiograph of 10 implants in the maxilla and 8 implants in the mandible, all with abutments and cylinders supporting the prostheses.

of the maxillary and mandibular prostheses at this visit. This involved the following steps: taking an interocclusal registration (Figure 6), removing the original prostheses and replacing them with long guide pins, taking a wash pickup impression of both prostheses (Figure 7), placing various analogs into the modified impression copings of the prostheses, and pouring a master cast. In the opinion of the authors, use of the all-acrylic prostheses is the most accurate means of obtaining an impression for the immediately loaded implants.

Once the maxillary and mandibular master casts were poured beneath the all-acrylic prostheses, the master casts were articulated using the interocclusal registration as a guide (Figure 8). Alginate impressions of the original prostheses were then taken in the laboratory and articulated on the same interchangeable articulator. These impressions of the conversion prostheses were used as blueprints for the fabrication of the final reconstruction.



Figure 5 Postsurgical esthetic result of maxillary and mandibular prostheses.

The acrylic facings on the maxillary conversion prostheses were repaired, and both prostheses were placed back into the patient's mouth for evaluation of the midline, plane of occlusion, lip support, and other prosthodontic details by both the prosthodontist and the dental laboratory technician (Figure 9). Details of the design of the final reconstruction in relation to the acrylic conversion prostheses were relayed to the laboratory for construction of the final prostheses.

A gold bar was fabricated for the mandibular arch upon which acrylic denture teeth were set in wax and processed into acrylic. Once an ideal plane of occlusion was achieved in the mandibular reconstruction, the laboratory work was initiated on the maxillary reconstruction. An acrylic bar was made to connect all the implants upon which a wax-up was done for the ceramometal framework. Cross-arch bars were used to help maintain the structural integrity of the prostheses through the porcelain



Figure 6 Prostheses 3 months after surgery with missing facings and interocclusal registration using Regisil (Dentsply Caulk, Dentsply International Inc., Milford, DE, USA).

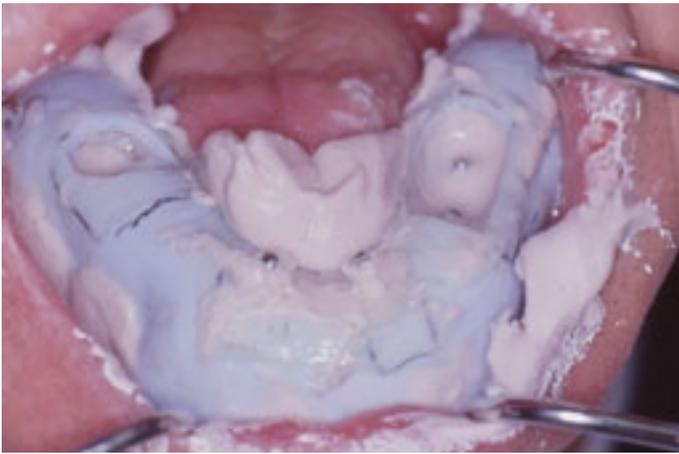


Figure 7 Alginate pickup of acrylic prostheses for the fabrication of master casts.

firing cycles. Pink and white porcelain was baked to the maxillary framework to provide the ideal esthetics.

The patient, who had made plans to remain in the area during the three-day period during which the final restoration was fabricated, returned to the office for a simultaneous intraoral tryin of the bisque baked maxillary reconstruction and the final mandibular hybrid reconstruction. Occlusal adjustments were made and color was evaluated. A final color glaze was accomplished, and the cross-arch bars were sectioned. The final reconstruction was delivered, and the patient returned home.

It should be noted that only one (in the lower left posterior) of the 18 immediately loaded implants failed to osseointegrate, one in the lower left posterior. Given the positioning of the implants throughout the mandibular arch, it was felt that first



Figure 8 Articulation of maxillary and mandibular master casts using maxillary and mandibular prostheses and interocclusal registration.



Figure 9 Evaluation of the acrylic prostheses for midline, lip support, and plane of occlusion.

molar occlusion could still be established using a cantilever on the lower left side in the final prosthesis (Figure 10).

In the maxillary arch, all ten implants osseointegrated, including both zygoma implants and both pterygoid implants. This allowed for a full maxillary reconstruction without any cantilevers (Figure 11). The ability to work closely with the laboratory technicians at the treatment center enabled the rapid turn-around time for this patient's reconstructions (Figure 12).

Three years after completion of treatment, the patient reported functioning well with no complications. A prosthodontist in the vicinity of his home provides normal oral hygiene and ongoing evaluation of the reconstructions.

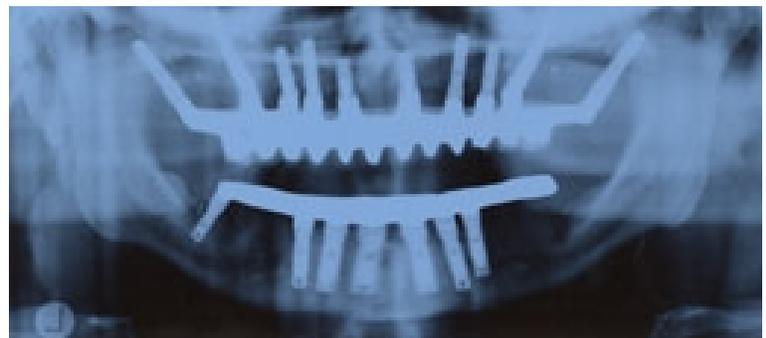


Figure 10 Post-treatment panoramic radiograph of final metal-reinforced prostheses.



Figure 11 Maxillary porcelain-fused-to-gold restoration opposes mandibular hybrid gold bar denture teeth.

Conclusion

In this case, the author's surgical and prosthetic protocol enabled long-distance treatment of a patient who had been previously diagnosed as being untreatable in the absence of extensive grafting procedures. The inconvenience of 1 to 2 years of treatment time, coupled with the unacceptable period of time during which the patient would have had to function without any teeth motivated him to seek a better solution. The new protocol provided fixed teeth the same day of the patient's initial visit to the treatment center and facilitated a successful and esthetically pleasing and functional final reconstruction.



Figure 12 Ideal esthetic and functional results with final restorations three months after initiation of procedure.

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