

Multidisciplinary Approach to a Full-Mouth Reconstruction



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The ever-expanding demand for cosmetic dentistry has not only helped the dental profession, but has also created more demand and training for clinicians.¹ More often than not, patients tend to be more informed and have more demands, both realistic and unrealistic. Thus the challenge a clinician faces everyday becomes how to balance the functional, scientific, and anatomic aspects of dentistry with the more abstract artistic side to arrive at a treatment result that will not only satisfies the cosmetic goal of the patient but also the long-term goal of the clinician concerning proper and stable occlusion.

To execute an esthetic and functional treatment, the clinician must be armed with not only the traditional diagnostic tools such as radiographs, properly mounted study and diagnostic models, and wax-up, the clinician also must be proficient in photography, and, most importantly, be armed with a critical eye and imagination that allow him or her to envision the desired result before even starting the treatment.

This article will discuss a multidisciplinary full-mouth reconstruction case involving osseous crown lengthening; porcelain veneers, crowns, and bridges; and root-form implants. By the end of the article, the reader should be well aware of the important role of soft-tissue profile and how this not only affects gingival esthetics, but also the restorative outcome of the treatment, both functionally and esthetically.

Case Presentation

The patient was a healthy 55-year-old woman. Her primary goal was to have a more attractive smile, replace the old unattractive crowns and bridges, and replace the missing teeth in her right mandibular quadrant (Figures 1A through 1C). The patient also mentioned a history of migraine headache.

After the initial consultation, an appointment was scheduled for radiographs (panoramic and full-mouth series), impressions for study and diagnostic models, face-bow and bite registration, photographs, as well as periodontal, occlusal, and esthetic evaluation. The patient was then scheduled for treatment presentation including procedures, cost, time frame, and anticipated result.



Figure 1A—Full smile before treatment.



Figure 1B—Upper arch before treatment.



Figure 1C—Lower arch before treatment.

During the treatment presentation, orthodontic treatment was discussed to help close the large diastema between teeth Nos. 11 and 12 as well as achieve a better occlusal plane, but was refused by the patient. As a result, a more extensive esthetic/osseous crown lengthening procedure had to be considered.

During the patient's hygiene visit, after administration of topical anesthetic gel and a small amount of local anesthesia, bone sounding was carried out in the areas of teeth Nos. 4 through 13. The preoperative sounding of the alveolar crest at the surgical sites of teeth Nos. 4 through 13 was accomplished to estimate the osseous contour and supercrestal dimension of the gingival tissue.^{2,3} This step was used to determine the thickness of the soft-tissue layer and proximity of the alveolar bone during the planning stages of the various surgical procedures.¹ Taking

into account her history of migraine, generalized moderately severe abrasion, multiple abraded lesions, and compromised occlusion (both natural and iatrogenic), diagnostic models were made on which surgical stents for the crown lengthening as well as endosteal implants (for teeth Nos. 29 through 31) were fabricated.

Treatment

Once the treatment plan had been discussed in detail, the first phase of treatment was initiated with the crown lengthening procedure.

After reviewing all consent forms and confirming that the patient had taken the prescribed medications (amoxicillin 825 mg, decadron 1.5 mg, and ibuprofen 250 mg) as directed, the patient was given a rinse of 0.12% chlorhexidine before surgery.^{4,5} The surgical guide was inserted and the

patient was again asked to smile widely to verify the accuracy and stability of the stent.³ After application of topical gel, local infiltration was administered using, initially, Citanest plain (Dentsply Pharmaceutical) for comfort, and then marcaine 0.5% with 1/200,000 epinephrine.

Armed with information from the bone sounding procedure, osseous resection and recontouring were deemed necessary. While the apically positioned flap preserves the attached gingiva, the osseous surgical component of this procedure requires the removal of supporting bone from adjacent teeth to develop a physiologic postsurgical contour.⁶⁻⁹ A papilla-preserving incision was then performed to maximize the preservation of the interdental papillae.¹⁰ Following the outline of the surgical guide, the marginal soft tissue was incised with a Bard-Parker blade #3C (BD). A full-thickness flap was reflected from the mesial half of tooth No. 3 to the distal of tooth No. 13. The osseous contour was examined visually and reshaped with a surgical handpiece and appropriate diamond burs, at all times ensuring at least 3.0 mm distance between future restorative margins and the osseous crest to avoid violating the biologic width.^{11,12} The flap was then re-approximated and secured with 6-0 gut suture (Hu-Friedy).

After appropriate monitoring and reviewing of postoperative instruction, the patient was rescheduled for a postoperative check within 7 days, and suture removal in 14 days, and any necessary touch-up with a diode laser (American Dental Technologies) in 30 days. To ensure a predictable result, no restorative procedure was to be done



Figure 2A—Immediately after crown lengthening.



Figure 2B—Full smile 6 weeks after crown lengthening.



Figure 3A—Flap sutured after implant placement.

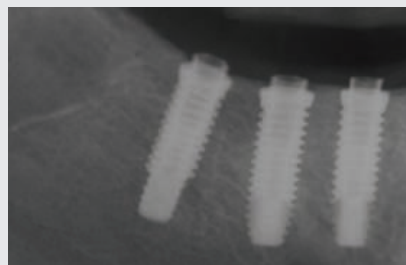


Figure 3B—Radiograph of implants showing correct depth and placement.

for at least 20 weeks after the crown lengthening procedure (Figures 2A and 2B).^{12,13}

While waiting for initial healing and maturity of the surgical area in teeth Nos. 3 through 13, the patient was appointed for the implant placement replacing teeth Nos. 29 through 31. Once again, after vital signs and consent had been obtained, the patient was given a rinse of 0.12% chlorhexidine for 30 seconds. The surgical stent was then tried in before local anesthesia was given using Citanest plain 4% and Xylocaine 2% with 1/100,000 epinephrine (Astra Zeneca). A midcrestal incision and necessary vertical releasing incisions were made starting from the distal of tooth No. 28 and extending an adequate distance for flap reflection and placement of the 3 implants (Figures 3A and 3B).

After necessary radiographs to

verify alignment and depth, the flap was closed with 4-0 Vicryl suture (Ethicon, Inc) and 4-0 gut suture (Hufriedy). The decision to use the Maestro externally hexed implants (BioHorizons, Inc) was based on clinical assessment of the quality and quantity of the bone as well as the patient's habit and force factor. The implants' engineering design includes square threads that maximize the implant-bone contact area as well as help direct force along the long axis of the implants where they are most resistant to force.¹⁴ Proper surgical techniques with adequate design and superstructures will successfully support various types of prostheses in the completely or partially edentulous patient.¹⁵⁻¹⁷

After 14 days, the patient was asked to return for suture removal and postoperative check. While awaiting the osseointegration of the implants,

appointments were scheduled for veneers, crowns, and a bridge in the upper arch. During the first visit of the prosthetic phase, after proper protocol and anesthesia with marcaine 0.5% with 1/200,000 epinephrine, the old bridge from teeth Nos. 3 through 5 was removed and the underlying preparations were modified and rebuilt as necessary. Veneers were prepared for teeth Nos. 6 through 11, and full crowns on teeth Nos. 12 and 13 (Figure 4). The gingiva was then retracted and an impression was made with a custom tray and Aquasil Ultra (Dentsply Caulk). A face-bow was then taken before the provisional restorations were luted and adjusted (Figure 5). The patient was then scheduled for the restoration of teeth Nos. 19 through 28.

During this visit, the old bridge on teeth Nos. 19 through 21 was removed, rebuilt, and modified slightly. Tooth No. 22 was prepared for a crown instead of a veneer because more reduction was necessary to correct the facial malalignment. Teeth Nos. 23 through 28 were then prepared for veneers. At this point, a bilateral posterior bite was obtained relating the prepared mandibular teeth to the maxillary provisionals. Subsequently, the provisionals on teeth Nos. 7 through 10 were removed and a stick bite was taken with the already set bilateral posterior bite in place acting as a stopping point to prevent overclosure. The lower impression was then taken with Aquasil Ultra, and all exposed preparations were provisionalized with Luxatemp (Zenith/DMG). The patient was then scheduled for a refinement visit before finalizing the restorations.

On the day of delivery of the



Figure 4—Frontal view of preparations in upper arch.



Figure 5—Upper arch temporaries.



Figure 6A—Occlusal view of exposed implants.

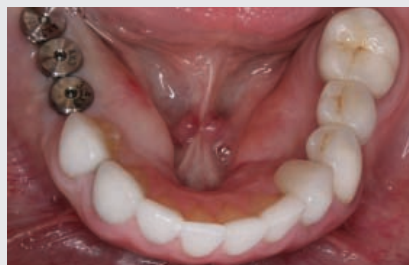


Figure 6B—Occlusal view of healing abutments.

restorations for teeth Nos. 3 through 28, following normal protocol, the restorations were presented to the patient on the models. This step helped mentally assure the patient that everything was going as planned and that the restorations appeared beautiful in the patient's hands. After having obtained anesthesia, the provisional restorations were removed. The preparations were cleaned with Tubulicid Red (Global Dental) and retraction cords were placed in the sulci where veneers were prepared. The porcelain restorations were then tried in the mouth and presented to the patient for approval before initiating the cementing procedure.

Once the patient had a chance to evaluate the restorations with a hand mirror and give final approval, all preparations were once again cleaned with Tubulicid Red, etched for 20 sec-

onds with 37.5% phosphoric acid, and rinsed with water. All preparations were then coated with a thin layer of Prime & Bond NT (Dentsply Caulk), and air-dried for 5 seconds. The veneers were etched with hydrofluoric acid (Ultradent Porcelain Etch) for 2 minutes, rinsed, dried, and silanated (Silane Primer, Kerr Corporation) before a coat of Prime & Bond NT was brushed on. The veneers were then luted with Vitique resin (Zenith/DMG) and light-cured. The porcelain-fused-to-metal (PFM) crowns and bridges were luted with RelyX Unicem (3M ESPE).

After clean-up, adjustment, and polishing, the marginal areas of the veneers were re-etched with 37.5% phosphoric acid and Prime & Bond NT was re-applied and light-cured for 40 seconds. All retraction cords were removed and the occlusion was verified with the patient seated. The patient was then

scheduled for a follow-up visit to check for comfort and to verify the occlusion.

After the follow-up visit, the patient was scheduled for the second stage of implant surgery, during which the implants were uncovered and the permucosal extensions (healing abutments) were placed to help develop the soft-tissue emergence profile (Figures 6A and 6B). The patient was seen 30 days later for abutment fitting, preparation, and impression for final prostheses. During the interim, a provisional bridge was made for teeth Nos. 29 through 31 as were abutments with Integrity (Dentsply Caulk) to progressively load the implants.¹⁷

After 45 days, the final PFM prosthesis was tried in and cemented with Premier Implant Cement (Premier Dental). The occlusal table for this prosthesis was intentionally designed to be more narrow than normal to reduce off-set load, facilitate daily care, improve axial loading, and also reduce the risk of porcelain fracture.¹⁸ After all excess cement had been cleaned up, a radiograph was taken to make sure all residual cement had been removed. The patient was then scheduled for a follow-up visit to have the occlusion checked again and impressions and bite registration made for a splint to wear at night.

During the visit for the splint delivery, photographs were taken of the case to document the final restorations (Figures 7A through 7D). The patient was then instructed on the importance of a 3-month recall during the first year to monitor the implant site. As far as missing tooth No. 14 is concerned, the patient said she will be ready for another implant/crown in the near future.



Figure 7A—Retracted view of restored dentition.



Figure 7B—Occlusal view of restored upper arch.



Figure 7C—Occlusal view of restored lower arch.



Figure 7D—Radiograph of implants after 2 years showing no bone loss.

Conclusion

This article illustrates the importance of proper and logical treatment planning as well as clear communication between the dental team and the patient regarding the outcomes of the planned dental treatment. An esthetic and functional result can only be achieved if the clinician is patient, communicates well with the patient, and plans a logical treatment sequence. The complexity of a case can be simplified if it's broken down into separate parts that can be addressed sensibly. For this patient, the treatment outcome exceeded her expectation. Certainly, her quality of life has greatly improved. She is very happy with the function, fit, and appearance of the restorations, and her migraine headache has completely dissipated. ©

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Product References

Product: Citanest plain
Manufacturer: Dentsply Pharmaceutical
Location: York, Pennsylvania
Phone: 800.225.2787
Web site: www.dentsplypharma.com

Product: Bard-Parker blade
Manufacturer: BD
Location: Franklin Lakes, New Jersey
Phone: 201.847.6800
Web site: www.bd.com

Products: 6-0 gut suture, 4-0 gut suture
Manufacturer: Hu-Friedy
Location: Chicago, Illinois
Phone: 800.483.7433
Web site: www.hu-friedy.com

Product: diode laser
Manufacturer: American Dental Technologies
Location: Corpus Christi, Texas
Phone: 800.359.1959
Web site: www.americanmedicaltech.com

Product: Xylocaine 2% with 1/100,000 epinephrine
Manufacturer: AstraZeneca
Location: Wilmington, Delaware
Phone: 800.236.9933
Web site: www.astrazeneca-us.com

Product: 4-0 Vicryl suture
Manufacturer: Ethicon
Location: Somerville, New Jersey
Web site: www.ethicon.com

Product: Maestro externally-hexed implants
Manufacturer: BioHorizons, Inc.
Location: Birmingham, Alabama
Phone: 205.967.7880
Web site: www.biohorizons.com

Products: Aquasil Ultra, Prime & Bond NT, Integrity
Manufacturer: Dentsply Caulk
Location: Milford, Delaware
Phone: 800.532.2855
Web site: www.caulk.com

Products: Luxatemp, Vitique resin
Manufacturer: Zenith/DMG
Location: Englewood, New Jersey
Phone: 800.662.6383
Web site: www.zenithdental.com

Product: Tubulicid Red
Manufacturer: Global Dental Products
Location: North Bellmore, New York
Phone: 516.221.8844
Web site: www.gdpdental.com

Product: Ultradent Porcelain Etch
Manufacturer: Ultradent, Inc.
Location: South Jordan, Utah
Phone: 888.230.1420
Web site: www.ultradent.com

Product: Silane Primer
Manufacturer: Kerr Corporation
Location: Orange, California
Phone: 800.537.7123
Web site: www.kerrdental.com

Product: RelyX Unicem
Manufacturer: 3M ESPE
Location: St. Paul, Minnesota
Phone: 888.364.3577
Web site: www.3m.com/dental

Product: Premier Implant Cement
Manufacturer: Premier Dental
Location: Plymouth Meeting, Pennsylvania
Phone: 888.670.6100
Web site: www.premusa.com