Multimedia implant case

When a single tooth is missing and a three-unit bridge is placed, preserving the alveolar ridge is critical. This multimedia case involves tissue grafting and laser procedures.

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hannon Pace, DAII, came to my office for some fairly comprehensive treatment. In addition to fixing her clinical problem, she also was looking forward to using the experience as a patient to help her be more empathetic and instructive with her own patients (see the sidebar below for her observations).

She presented with porcelain laminate veneers on tooth Nos. 4 to 12 (Figure 1). Tooth No. 7 had marginal gingivitis and was sensitive to percussion. She was treated for acute pulpitis with root canal therapy, but the pain persisted. The endodontist diagnosed a root fracture and the tooth was scheduled for removal. Although there was adequate space for an implant, Shannon elected to have a three-unit bridge placed instead.

Given Shannon’s age (28 years old), it is imperative to think about preserving the alveolar ridge for long-term esthetics. One of the advantages of implant placement is that the alveolar ridge will be preserved. In lieu of implant placement, bone grafting will help preserve not only the interproximal alveolar ridge height that is critical for papillae retention, but just as important, the facial contour in the edentulous area. The surgical plan will involve atraumatic extraction of the maxillary right lateral incisor by carefully luxating the tooth toward the palatal aspect. Once the extraction site is filled with the bone grafting material, a provisional restoration with an ovate pontic design will form a primary closure over the surgical site, thus retaining the graft material and helping to support the periodontal tissues during the healing phase of treatment.

Surgery and bone grafting

After administering local anesthesia, the porcelain veneers on the teeth adjacent to tooth No. 7 were removed. The preparations were extended interproximally to become full-coverage abutments for a three-unit pressed ceramic bridge (Optimal Pressed Ceramic, Pentron Lab Technologies, www.pentron.com).

Once the preparations are complete, a surgical procedure will involve elevation of a mucoperiosteal flap, exposure of the infraorbital foramen, and onlay grafting with bone harvest from the chin. The bone graft will be packed into the extraction site with a morselized bone grafting material (Bicon, www.bicon.com) and held in place with provisional restorations (Figure 2).

Advantages of implant placement:

• Full coverage of the alveolar ridge for long-term esthetics
• Preservation of the alveolar ridge height
• Preservation of the facial contour
• Preservation of the papillae
• Preservation of the labial bone plate

Patient preparation:

Before the procedure:

• Do not eat for at least 12 hours prior to the procedure.
• Do not drink anything containing alcohol for 24 hours before the procedure.
• Do not take any anti-inflammatory medications for 24 hours before the procedure.
• Do not take any blood-thinning medications for 72 hours before the procedure.
• Do not take any anticoagulant medications for 48 hours before the procedure.

During the procedure:

• The patient will be under local anesthesia and conscious sedation.
• The patient will be given intravenous sedation.
• The patient will be given a topical anesthetic.
• The patient will be given a local anesthetic.
• The patient will be given an intravenous anesthetic.
• The patient will be given a general anesthetic.

Postoperative care:

• The patient will be given a prescription for pain medication.
• The patient will be given a prescription for antibiotics.
• The patient will be given a prescription for a topical anesthetic.
• The patient will be given a prescription for a local anesthetic.
• The patient will be given a prescription for an intravenous anesthetic.
• The patient will be given a prescription for a general anesthetic.

Multimedia case conclusion:

The multimedia case presented here involves the treatment of a patient with porcelain laminate veneers on tooth Nos. 4 to 12. The patient presented with marginal gingivitis and was sensitive to percussion. She was treated for acute pulpitis with root canal therapy, but the pain persisted. The endodontist diagnosed a root fracture and the tooth was scheduled for removal. Although there was adequate space for an implant, Shannon elected to have a three-unit bridge placed instead.

Given Shannon’s age (28 years old), it is imperative to think about preserving the alveolar ridge for long-term esthetics. One of the advantages of implant placement is that the alveolar ridge will be preserved. In lieu of implant placement, bone grafting will help preserve not only the interproximal alveolar ridge height that is critical for papillae retention, but just as important, the facial contour in the edentulous area. The surgical plan will involve atraumatic extraction of the maxillary right lateral incisor by carefully luxating the tooth toward the palatal aspect. Once the extraction site is filled with the bone grafting material, a provisional restoration with an ovate pontic design will form a primary closure over the surgical site, thus retaining the graft material and helping to support the periodontal tissues during the healing phase of treatment.

PERSPECTIVE

THE PATIENT PERSPECTIVE

Becoming a patient provides valuable experience for tactful, insightful, and helpful explanation of treatment plans.

Empathy is understanding, being aware of and being sensitive to the feelings, thoughts, and experiences of another. It can be difficult for the dental assistant who has never undergone a particular procedure to understand the mental apprehension and physical discomfort the procedure may cause. The dental assistant must be able to explain and validate treatment plans in a way that conveys competence and confidence, and allays the patient’s fears. My experience as Dr. Lowe’s patient for the dentistry described here taught me how to develop some patient guidelines in an effort to empathetically explain what patients will be going through and to help minimize any discomfort.

Pre-operative appointment

After the treatment coordinator has explained the dental treatment plan, we then give our patients a pre-operative instructions sheet to help the patient prepare for the dental procedure. Here’s what’s covered:

• Be well-rested. This will help with any apprehension you may have during your dental treatment.
• Eat a healthy breakfast. After the procedure, some patients do not feel like eating due to the anesthetic. If you are pre-medicated, it helps to settle your stomach.
• If taking any vitamins or baby aspirin, stop taking the medication 3 days prior to the appointment. The procedure may cause some bleeding, and these medications slow clotting. Some dental materials require us to keep our suits cool during procedures. We will supply a blanket, along with heated massage chairs. Wear clothing that will keep you warm.

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“trap-door” flap design is raised on the palatal aspect exposing the alveolar crest. An Er:Cr:YSGG laser (Waterlase: Biolase Technologies, www.biolase.com) was used to conservatively remove alveolar bone to gain access for a periosteal to sever the periodontal ligament fibers (Figure 2). For bone removal, the Er,Cr:YSGG laser can reach interproximally with minimal removal of bone—unlike conventional rotary instruments, which are larger and may remove more interproximal bone.

After extension of the preparations of abutment teeth for three-unit bridge placement, a full thickness mucoperiosteal flap is elevated from the palatal aspect. An Er,Cr:YSGG laser (Waterlase: Biolase Technologies) is used to carefully remove crestal bone so the tooth can be luxated toward the palatal direction, preserving the interproximal bone and facial plate. The extraction socket is shown. Note the preservation of the interproximal bone and facial plate after atraumatic tooth removal.

Synthetic graft material (Bioplant SSD) is placed into the extraction site after tooth removal to the level of the crest of bone.

The provisional restoration is shown (Luxatemp by Zenith DMG) after carving and polishing. Note the shape of the ovate pontic, which needs to extend 2 mm to 3 mm into the extraction site. This radiograph shows the relationship of the ovate pontic to the grafted extraction site. The ovate pontic actually forms a primary closure for the graft material. A full-arch retracted view is shown two weeks after extraction of tooth number 7. At 2 weeks’ post-surgery, the provisional restoration is removed and the crestal bone level is sounded with a periodontal probe. When healing is complete, the tip of the papillae interproximally can be predicted to be located 5 mm incisal to the bony crest. If an intracrevicular margin is desired, it should be located 4 mm from the bony crest interproximally. Since the periodontal probe sounds to 6 mm, the restorative margin can be adjusted accordingly. A round tapered diamond (Brasseler USA) is used to adjust the interproximal restorative margin to 4 mm from the interproximal bony crest. The marginal correction is verified at 4 mm using a periodontal probe.
Figure 3 shows the extraction site with interproximal and facial crestal bone intact. Remember, never compress the facial plate after tooth extraction.

Next, place the synthetic bone graft material into the extraction site (Bioplant SSD, Kerr Corp., www.kerrdental.com). The graft material comes packaged in a single-socket-dose syringe. The syringe tip is placed into the extraction site and blood is drawn into it to be mixed with the graft material. This blood contains progenitor cells important in the regeneration of bone in the socket. The mixture is then syringed into the extraction site to the crest of the bone (Figure 4).

Provisionalization

A provisional restoration is fabricated (Luxatemp (shade BL), Zenith Dental, www.zenithdental.com) from a pre-operative model, and an ovate pontic is created that will extend 2 mm to 3 mm into the extraction site (Figure 5). The bottom of the pontic is shaped like the large end of an egg. This shape will help to support the gingiva in their pre-extraction positions by exerting horizontal pressure below the crest of the gingival tissues. Figure 6 shows a radiographic view of the provisional ovate pontic in place in the extraction site following placement of the bone graft. The interproximal bone has been maintained and the ovate pontic creates primary closure over the extraction site. As the gingival tissues heal, the ovate provisional pontic will appear to emerge from the extraction socket in much the same manner as the original crown (Figure 7).

As the extraction site (ovate site) heals, the interproximal restorative margin can
be measured and adjusted by sounding to the crest of bone and using a diamond bur to make necessary marginal adjustments to place the margin 4 mm from the alveolar crest (Figures 8-10). Because the interproximal dental papillae can be expected to extend 5 mm incisally (coronal) to the alveolar crest, a margin adjusted to the 4-mm level can ultimately be expected to be located 1 mm below the free gingival crest (intracrevicular).

Esthetic laser gingival correction
After 30 days of healing in the ovate pontic site, the facial margin of the free gingiva extends approximately 1 mm apical to the central incisors (Figure 11) and must be corrected for proper esthetic balance.

Post-operative experience
I left the office with my teeth starting to “wake up.” I did not take anything before or during the procedure—but I should have. This is most important for the patient who is undergoing a lengthy procedure.

The day my teeth were prepared, I not only had full-mouth reconstruction, but also synthetic bone placement, gingival contouring, and surgical crown lengthening. If I had taken ibuprofen or acetaminophen before the treatment started, I would not have had as much discomfort.

Driving home, all I could think of was getting something warm on my gums. I stopped and bought some coffee. Instantly my gums were soothed, and my teeth didn’t ache anymore. It wasn’t until after my temporaries were placed that I realized what patients not only feel, but also taste. The next day, I wrote up these post-op patient instructions based on my experience and my provisional home-care regimen:

Post-operative protocol for preparation appointment
The following supplies are being provided for you:

- Crest Spinbrush Toothbrush
- Oxyfresh Rinse (Zinc or Lemon)
- Oxyfresh Tissue Gel
- Oxyfresh Toothpaste
- Waterpik Flosser or Irrigator
- Zilaction Lip Balm
- 10 (800 mg) ibuprofen
- MI Paste by GC America
- Take-home mug with drink packets
- Listerine Pocket Pack and Dazzling Breath Drops
After placement of your provisionals, we recommend the following steps to minimize any discomfort:

- Take up to 800 mg of ibuprofen or acetaminophen every 6 hours as needed for the first 24 hours.
- Brush at least twice a day. Before brushing, hold your toothbrush under warm running water to spread out and soften the bristles for more gentle brushing.
- After the first couple of days following laser contouring, you may see a thin white line where the provisional and the gum meet. It is the body healing itself. Apply Oxyfresh Tissue Gel with Aloe 4 times daily and after brushing at bedtime.
- For any sensitivity, use the MI Paste several times a day. Do not rinse or brush for 30 minutes after application.
- Although the provisionals look like single units, they are splinted together for strength so you cannot floss conventionally. Use the provided electric flosser or irrigator to remove any food or plaque.
- Use the provided mouthrinse twice daily, preferably after breakfast and before bedtime. Rinse for a full 30 seconds for healing of the tissue, reducing tissue redness and inflammation, and controlling bleeding.
- Drink something warm (tea, coffee, cocoa or apple cider). This will help soothe any areas that are tender and also will help you to relax after your dental appointment. Some packets are provided in your take-home care package.
- The provisional restorations absorb fluids and may become stained by certain dark pigmented foods and drinks such as curry, blueberries and blackberries. The provisionals also may have an odor after awhile, due to leakage. We have provided some Listerine pocket packs to help.
- Your provisionals are made of acrylic. Acrylic shrinks and contracts. You may hear some popping sounds while drinking hot or cold beverages. This is normal. When drinking something hot, your temporaries may feel loose. When drinking something cold, they may feel tight. We recommend drinking fluids at room temperature.
- Avoid foods that are hard and sticky, as they may break or pull off your temporaries. When I first had my provisionals placed, I bit into a bagel and broke them. Avoid biting into foods that are hard or crunchy. I tell patients to not bite into anything with their provisionals. Cut everything up and chew on your back teeth. Eat soft foods, such as baked chicken, fish, pasta, mashed potatoes, cooked vegetables, eggs, oatmeal, grits and yogurt.
- Avoid any foods that may be highly acidic. Barbecue sauce, ketchup, orange juice, grapefruit juice, or hot sauce may burn or irritate the tissue area.
- Lips sometimes can get chapped and sore from stretching them during the procedure. Lip balm is provided for comfort.
- If you should lose or break a provisional, do not panic. Call the office and bring the piece that broke with you to the appointment. Do not throw the piece away. It can usually be recemented without any problems.

I will be checking in on you tonight, but if you have any other questions don’t hesitate to call our office.
After healing, the gingival height of the maxillary centrals needs adjusting so that their level is apical to the laterals. A diode laser is used to correct the gingival levels over the maxillary central incisors. A 45° external bevel is created using the laser fiber in a “brush stroke” fashion. The gingival correction for the maxillary centrals and laterals is shown after laser correction and prior to correction above the maxillary cuspids. The bony crest on the facial margin of the right maxillary central sounds at about 2 mm. This means 1 mm of bone will need to be removed to re-establish biologic width and 1 mm gingival sulcus. The Er,Cr:YSGG laser is used via the gingival sulcus to remove the crestal bone without reflection of a mucoperiosteal flap. The bony crest is sounded at 3 mm from the restorative margin after “closed crown lengthening” has been completed.

**Final gingival correction**

Once the surgical phase is completed, the provisional is corrected to the new marginal levels (Figure 17). When using bis-acrylic provisional material, correction of cervical profiles on the affected teeth can easily be done using flowable composite followed by microhybrid composite on the surface. The existing provisional restoration should be beveled 3 mm to 4 mm in the area to be added. As long as the surface is clean, there will be enough micromechanical retention to directly add a layer of flowable composite over the bevel and exposed tooth surface. Light cure this first layer, and then add the microhybrid composite layer (Point 4 shade T1, Kerr Corp.) directly over the top of the flowable. A soft, sable (#2 Keystone, Patterson Dental Supply, www.pattersondental.com) artists’ brush can be used to feather the unset microhybrid and blend it with the existing provisional’s contours.

After light curing, eight-fluted composite finishing carbides (ET 3, ET 9: Brasseler USA, www.brasselerusa.com) are used to sculpt the surface and finish the gingival margins. After 2 weeks of healing (following laser closed crown lengthening), the gingival tissues are shown with and without provisional restorations in Figures 18 and 19. Only a minor gingivoplasty is required to create symmetry. The correction is outlined with a fine marker so that it can be compared.
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to the adjacent central incisor prior to removal of the gingival tissue (Figure 20). The diode laser (Figure 21) is used to make the gingival correction of free gingival only.

A microhybrid composite is used to refine the cervical contours of the provisional restoration. The margins must be precise and the cervical contour correct so that the marginal gingiva will heal properly and be held in place, creating a refined gingival zenith that more closely resembles the one on the adjacent central incisor. After a few additional weeks of healing, the tissue health and gingival contours are assessed. The heights of the gingival tissues above the maxillary central incisors are now slightly higher (apical) to the maxillary lateral incisors. The gingival tissues above the maxillary canines

[17] This view is after laser correction of biologic parameters. By not reflecting a flap, the post-op healing is fast with less discomfort. [18] At 2 weeks’ post “closed crown lengthening” surgery, the tissues are ready for master impressions. [19] Two weeks after intrasulcular “closed crown lengthening” surgery, note the maturity of the surgerized tissue and the precision of the restorative margin placement relative to the crest of the free gingiva. [20] The discrepancy in the gingival zeniths above tooth Nos. 8 and 9 is shown. [21] A diode laser makes a minor correction in the free gingival zenith above tooth No. 9. A minimum sulcus depth of 1 mm is maintained; therefore, no further bony correction is necessary.
are at approximately the same level as the maxillary central incisors. At this point, final impressions can be taken to complete the case. First, a #00 cord (Ultrapak, Ultradent, www.ultradent.com) is placed into the gingival sulcus and trimmed so that there is no overlap. Next, a #1 cord (Ultrapak, Ultradent, www.ultradent.com) is placed on top of the #00, trimmed, and left in place for 2 to 3 minutes, as the dental assistant gets ready to load the impression tray with heavy-body impression material (Honigum, Zenith Dental, www.zenithdental.com). The master impression is then created.

**Delivery of the final restorations**

The case is fabricated by the ceramist and placed using dual-cure resin cement (Nexus, Kerr Corp., www.kerrdental.com). The delivered case is shown in a retracted view in Figure 22. Through the use of the technique of socket preservation, the edentulous site in the right maxillary lateral incisor position is virtually indistinguishable from the contralateral side. The facial marginal gingiva is supported by the ovate pontic as well as the interproximal gingival papillae. The use of dental lasers allowed minimal intervention bony surgery to be performed to correct esthetic levels of gingival and bony structures without the need of open flap surgery and the extended healing times associated with that procedure. The patient is extremely happy with her new smile (Figure 23).

**References**


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**Microscopy**

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