Treating a young adult with bonded porcelain veneers

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An 18-year-old woman had undergone orthodontic treatment as a young teenager to address the position of her maxillary anterior teeth. Her orthodontist had added composite to her undersized lateral incisors to create an ideal width. After the orthodontic treatment was complete, the orthodontist placed resin-based composite over brown and chalky white areas of the patient's lateral incisors to improve the esthetics.

During the next several years, the patient's previous dentist made multiple conservative repairs (Figure 1), but the patient had become self-conscious about her smile and desired a more predictable long-term solution. One option was to remove the resin-based composite material and redo the bonding; the other option was to place bonded porcelain veneers. When bonded porcelain veneers are preferred, clinicians need to use the most conservative, long-lasting approach.

The patient's dentist (G.F.S.) informed her of the advantages and disadvantages of both procedures. She opted to receive bonded porcelain veneers and returned to the dental office for a complete oral examination, radiographs, study models, a facebow, a bite registration, a stick bite and a series of clinical photographs. After reviewing all of the information with the patient, the dentist decided to place six porcelain veneers to accomplish the agreed-upon treatment goals.

ABSTRACT

Background. Esthetic dental treatment for young adults can be challenging. Practitioners often use direct composite bonding in children and teenagers, and often it serves them for many years. However, direct composite bonding has its limitations (such as staining and chipping), and bonded porcelain often is needed.

Case Description. The authors describe an 18-year-old woman who sought esthetic dental treatment. After her dentist discussed treatment options with her, she opted to receive bonded porcelain veneers. The dentist chose a lithium disilicate material on the basis of its strength and esthetic properties. Although the first set of veneers matched the patient's natural teeth well, they did not satisfy her objective of eliminating the white mottling that existed on her natural teeth. Therefore, the dental technician prepared a second set of restorations by cutting back the facial incisal areas slightly in wax to allow creation of incisal effects and by pressing them with a brighter ingot.

Clinical Implications. Collaboration between the dentist and dental technician is essential to achieving treatment success. Likewise, it is important to secure the patient's input during the process, as he or she often has ideas regarding his or her smile that are different from those of the dental team.

Key Words. Bonded porcelain veneers; lithium disilicate material; dental laboratory; esthetic treatment.
The practitioner then sent this information to a dental laboratory, along with a prescription describing the patient’s desires and the dentist’s goals. The dentist requested a diagnostic wax-up to facilitate fabrication of the provisional restorations.9,10

PROVISIONAL RESTORATIONS
During the tooth preparation appointment, the dentist administered local anesthetic to the patient and removed the resin-based composite from the six teeth. In preparing the teeth for veneers, the clinician’s primary goal was to remove the discolorations but conserve tooth structure (Figure 2). He used a bis-acrylic provisional material in a putty matrix to transfer the wax-up to the mouth. The dentist then removed the bis-acrylic material and inspected it for thin areas. If the reduction had been inadequate, the clinician would have fabricated a new provisional restoration after reducing the thin area further. The dentist then obtained final impressions, a bite registration, a stick bite and photographs of the tooth preparations to communicate preparation colors.11 He spot-bonded the bis-acrylic provisional restorations and refined the occlusion. The patient returned four days later for evaluation of the temporary restorations.

At this appointment, the patient was pleased with the esthetic results and had no complaints. The dentist refined the occlusion, paying close attention to lateral movements to include crossover. He then obtained an impression and photographs of the provisional restorations.

LABORATORY FABRICATION OF VENEERS
The dental technician (M.R.) evaluated photographs of the patient’s provisional restorations from an esthetic perspective and mounted models of them, which then underwent a functional analysis. To determine an appropriate action plan, members of the treatment team discussed any changes needed. In addition, it is important to secure the patient’s input at this time, as he or she often has ideas regarding his or her smile that are different from those of the dental team.

After the dentist and dental technician have reviewed the photographs, it is not unusual to decide that small contour changes are needed. If changes in overall tooth position are necessary, the patient will require new provisional restorations that reflect these changes and enable the dentist to evaluate form, function and phonetics. Otherwise, the laboratory moves forward with fabrication of the all-ceramic restorations, which replicate the desired elements of the provisional restorations. The laboratory also makes any slight changes deemed necessary by the treatment team and the patient.

To fabricate the all-ceramic restorations in this case, the dental technician poured and pinned all impressions and mounted the models. He treated prepared tooth dies with a cement spacer and wax separator and then trimmed the margins to allow access. The technician then made a silicone matrix of the approved provisional model and seated it carefully on the model of the prepared teeth.

The laboratory technician then made a small hole in the silicone matrix through the incisal edge of a central incisor. With the matrix seated on the prepared tooth model, he injected the wax through the incisal hole in the matrix and allowed it to cool for three minutes. He then removed the matrix carefully, leaving the wax on the working model. This process transferred the shape and position of the provisional restorations to the final restorations.

The technician then performed any final contouring to create the ideal embrasure form and surface morphology. He also made any required...
esthetic or functional changes. On completion of contouring, the technician reviewed the clinical photographs to select the ideal ingot for pressing the restorations.

The technician evaluated the color of the patient's underlying dentition by reviewing photographs obtained at the preparation appointment, measured the thickness of the wax-up to estimate the filtering effect and took into consideration the final desired shade when choosing the pressing ingot.12-14

**Lithium disilicate.** We chose a lithium disilicate material (IPS e.max Press, Ivoclar Vivadent, Amherst, N.Y.) on the basis of its strength and esthetic properties. An evaluation of the desired incisal translucency determined the need for, and amount of, incisal cutback to create room for the layered incisal effect. Pressable lithium disilicate demonstrates a flexural strength of 400 megapascals, whereas the layering ceramic exhibits a flexural strength of approximately 90 MPa.15-18 Therefore, our strategy was to use as much pressable ceramic and as little layering ceramic as possible while achieving the patient's esthetic goals.

In this case, the lack of incisal translucency in the patient's natural teeth led to the use of a monolithic approach (that is, use of a nonlayered material to achieve maximum strength) as described by Okuda19 and DiMatteo.20 The wax-up was sprued, invested and burned out, after which it was pressed in a dental ceramic oven. The technician then recovered the restorations from the investment via sandblasting and fit them back on the model.

The laboratory technician achieved final contour and surface texture by using diamond burs (Brasseler USA, Savannah, Ga.). The next step was to fabricate composite dies that replicated the color of the prepared teeth, and the technician placed the restorations on the composite dies to evaluate their color. He applied colored stains to create final effects in the restorations. In this case, the chosen ingot provided the correct color, with little modification required beyond replicating the white surface in the incisal aspect of the patient's natural teeth. This effect was accomplished by using white stain mixed with a glaze paste for durability.

The technician fired this layer to fix its position; he then covered the entire set of restorations with a glaze paste (that is, a thin layer of clear porcelain that internalizes the staining effects) and fired the restorations again. The dental technician fit the restorations to a solid model, paying close attention to the adaptation of contacts and embrasures to the tissue morphology. This prevented the formation of any black triangles between teeth. The technician etched the restorations and delivered them to the dental office for placement.

**DELIVERY AND TRY-IN**

The patient returned to the dental office for try-in and delivery of the porcelain veneers. The dentist administered anesthetic and removed the provisional restorations by sectioning them with a high-speed handpiece. The clinician cleaned the tooth preparations with chlorhexidine gluconate and tried in the veneers one at a time to verify fit. Once the margins and contacts were confirmed, he used try-in paste to evaluate the esthetics. The patient liked the shape and contours of the veneers, but she did not like the re-creation of the white striated effects. The match to the existing dentition was very good, but it was not what the patient wanted (Figure 3). The dentist obtained more photographs, and fabricated and spot-bonded new provisional restorations. The dental office returned the veneers to the laboratory, with instructions to remake them without the white effects.

**REMAKE OF CERAMIC VENEERS**

Although the first set of veneers matched the patient's natural teeth well, they did not satisfy her objectives of eliminating the white mottling that existed on her natural teeth and of achieving a brighter smile with incisal translucency. Therefore, a second set of restorations was fabricated, the facial incisal areas of which were cut back slightly in wax to allow creation of incisal effects, while still supporting the incisal edge with the stronger pressed material. The dental technician pressed these restorations as described earlier, but with a brighter ingot.

To produce the patient's desired translucency pattern, the technician used various effect pow-
orders to achieve incisal layering. He performed final grinding of the incisal areas to re-establish contour prior to cutback and glazed the restorations in a ceramic furnace. He etched the restorations and then returned them to the dental office.

SECOND DELIVERY APPOINTMENT
The patient and dental team members approved the second set of veneers on try-in. The clinician cleaned the internal surfaces of the veneers with phosphoric acid and then rinsed, dried and silanated them. He then placed a rubber dam to isolate the anterior segment and prepared the central incisors for bonding. No tissue retraction was needed. The dentist used a total-etch, single-bottle dentin adhesive with a transparent light-cure-only resin cement. He used the spot-cure, clean-up and final-cure technique. The clinician bonded the right canine and lateral incisor next, followed by the left canine and lateral incisor.

After all six veneers were bonded, the dentist removed the rubber dam and refined the patient’s occlusion. He polished all adjusted surfaces by using a three-step porcelain polishing system. At a follow-up visit two days later, the dentist checked the patient’s occlusion and obtained postdelivery photographs. The patient and dental team members approved the appearance of her teeth. After considering her treatment options, she decided to receive bonded porcelain veneers. As this case shows, collaboration between the dentist and laboratory technician is essential to achieving success. Clinicians also need to receive input from the patient during treatment, as he or she often has ideas about his or her smile that are different from those of the dental team.

CONCLUSION
We have presented a case of a young woman who sought dental treatment to improve the appearance of her teeth. After considering her treatment options, she decided to receive bonded porcelain veneers. As this case shows, collaboration between the dentist and laboratory technician is essential to achieving success. Clinicians also need to receive input from the patient during treatment, as he or she often has ideas about his or her smile that are different from those of the dental team.

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