No-Prep Veneers: New Ceramic Creates a Realistic Option

INTRODUCTION
The ability to predictably bond thin pieces of tooth-colored restorative material to teeth and expect excellent long term aesthetic/functional results has created a new arena in the practice of dentistry—that of elective cosmetic treatment. Not to say that these procedures “appeared over night;” they did not. However, over the last 20 or so years, the materials and technologies have continued to improve. Now, many procedures in which longevity was felt to be compromised by the “old school” critics have proven to be excellent and clinically viable treatment options. Teeth can now be “resurfaced” with tooth-colored restorative materials requiring very little, if any, tooth preparation.

Adhesive bonding technology allows the dentist to place a brittle restorative material of minimal thickness to the surface of the tooth that will not break under normal masticatory function. Hence, patients that are not happy with the smile “mother nature” provided can elect to have a “smile makeover” correcting aesthetic problems associated with tooth shape, position, and color. For many years, patients had to live with aesthetic problems that were tooth related. Orthodontics could straighten teeth, but could do nothing for malformation or problems associated with tooth color. The psychological ramifications to the patient with an unesthetic smile are only beginning to be understood and validated. Some dentists still believe that it is a “violation of the Hippocratic Oath” to do nothing. Patients often feel that they are unhappy with their smile; and that we should do nothing for them. Orthodontic treatment can straighten teeth and make home care and periodontal maintenance possible. Most of the restorations from no-prep cases that I have seen in my 27 years of practice appear to me as “unaesthetic, opaque, monochromatic chiclets” (Figure 1). In many of these cases, the previous dentists have aligned the crowded facial surfaces only to leave the functional (palatal) surfaces uncorrected, making maintenance or restoration difficult, or even impossible (Figure 2). As always, I believe the key to unlocking the major problems with the no-prep technique lies in selecting the proper case (small teeth with spaces, with slight lingual alignment being the most ideal), and having an all-ceramic material that can be made extremely thin and aesthetic, yet strong. This also means that the cervical margins need to be extremely thin (knife edge), and able to be finished by the dental laboratory technician. It is my opinion that it is nearly impossible to finish and polish ceramic margins in the mouth to the same degree as can be accomplished in the laboratory by the ceramist. 1,2

NO-PREP VERSUS MINIMAL-PREP PORCELAIN VENEERS
It has always been my belief that some preparation is required for porcelain veneer cases to achieve optimal aesthetic and biologically functional outcomes. Crowded cases need not only the facial surface positions corrected, but also the palatal surfaces as well (360° veneers) to functionally align these teeth and make home care and periodontal maintenance possible. None of the restaurations from no-prep cases that I have seen in my 27 years of practice have appeared to me as “unaesthetic, opaque, monochromatic chiclets” (Figure 1). In many of these cases, the previous dentists have aligned the crowded facial surfaces only to leave the functional (palatal) surfaces uncorrected, making maintenance or restoration difficult, or even impossible (Figure 2). As always, I believe the key to unlocking the major problems with the no-prep technique lies in selecting the proper case (small teeth with spaces, with slight lingual alignment being the most ideal), and having an all-ceramic material that can be made extremely thin and aesthetic, yet strong. This also means that the cervical margins need to be extremely thin (knife edge), and able to be finished by the dental technician. It is my opinion that it is nearly impossible to finish and polish ceramic margins in the mouth to the same degree as can be accomplished in the laboratory by the ceramist. 1,2

CASE REPORT: PERFORMING “FAMILY AESTHETIC DENTISTRY”
Case Planning and Making of Master Impressions
Our youngest daughter, Christine, will be turning 21 years old by the time this article is in print. She had orthodontics in her early teens to correct minor tooth alignment issues. Since high school graduation, she has wanted porcelain veneers to make her teeth “bigger and brighter.” Personally, I have always felt that minimal preparation porcelain veneers were the best option for long-term cosmetic changes for teeth. The enamel bond is very predictable, and aesthetic changes can be made without the addition of added bulk to the tooth surface, particularly at the gingival margin where excessive emergence profile may have negative periodontal consequences. The strength and aesthetics found at very minimal thicknesses, with new materials like lithium disilicate (IPS e.max [Ivoclar Vivadent]), has caused me to rethink my opinion of no-prep veneers; especially if the margins can be precisely finished by the dental technician in the laboratory, allowing for minimal mar-

continued on page xx
No-Prep Veneers...
continued from page 00

ginal refinement and polishing at the insertion appointment.

Figure 3 is a preoperative view of Christine’s smile. She has some minor surface hypocalcification secondary to orthodontic treatment, some small incisal edge chips on both maxillary central incisors, as well as a minute diastema. An intraoral retracted view (Figure 4) shows the corrected Class I occlusion with 2 mm of overbite and overjet. An occlusal/incisal preoperative view (Figure 5) shows very flat labial surface profiles of the anterior teeth with adequately sized facial embrasure spaces.

It is important to have enough room in the facial embrasures to wrap porcelain around the proximal facial line angles while maintaining the soft triangular shape of the facial anatomic form. In order to have a smooth emergence angle of porcelain off of the unprepared labial surface, the gingival extent of the ceramic must begin in the intracrevicular area. This will allow the technician to finish the ceramic to a finely finished margin, thus limiting any potential overhang of the material. One of the problems with popular “no-prep” techniques, which often make the promises of “no shots” and “nonretracted” impressions, is that it is impossible to create an aesthetic and biologically acceptable transition from tooth surface to porcelain that begins at the free gingival margin without creating an overhanging margin. Thus, many of these nonretracted, no-prep cases have the potential to result in gingival recession from bulky, overcontoured gingival margins (Figure 6). Christine’s expectation was to have “bigger, brighter” teeth, and her natural teeth were small. Fortunately she had flat labial surfaces with open facial embrasures; nature provided the “space” to allow the addition of porcelain without significantly increasing the overall thickness of the finished result.

The first step, for any patient that is being considered for “no-prep” veneers, is to make study models and have a laboratory wax-up done. This allows one to visualize if the addition of ceramic, without first creating the space, will

The Laboratory Perspective: Lithium Disilicate—Thin, Strong, and Aesthetic!

Jeff Stubblefield, CDT

Dr. Lowe called me regarding the possibility of fabricating no-prep veneers for his daughter, Christine. I asked him to send me preoperative models and photos so that we could evaluate them together. We evaluated the casts using some specific criteria. First, the existing tooth length was evaluated to determine its optimum aesthetic and functional position. Next, the alignment of the teeth was evaluated for spacing and/or rotation.

The preoperative casts were mounted on a semi-adjustable articulator (Denar Combi [Whip Mix]). An additive diagnostic wax-up was then fabricated idealizing the length-to-width ratio. This provides the dental laboratory technician with a guide for fabricating the veneers.

There are several materials that can be used to fabricate no-prep veneers. Traditional feldspathic porcelain is commonly chosen, but it can be brittle and difficult to fabricate in thicknesses of 0.3 mm to 0.5 mm. Cerinate porcelain is an example of a leucite-reinforced feldspathic porcelain that can be used to fabricate these restorations. However, at DAL Signature Restorations (a division of Dental Arts Lab), we use a product known as the “DAL P2Veneer” that utilizes the IPS e.max system. It is a lithium disilicate ceramic displaying excellent strength (400 MPa) with outstanding aesthetics. It can be pressed easily into 0.3 mm to 0.5 mm thicknesses, providing a very accurate fit with precise restorative margins. By using the high translucency (HT) ingots, these restorations can blend into dentition being practically “invisible.” This porcelain system also has an entire layering system, which gives the dental ceramist the ability to provide outstanding aesthetics. The DAL P2Veneer system is a system that is an evaluation-based system anchored in functional and aesthetic design. Areas requiring slight or partial preparation are identified and communicated to the doctor.

To fabricate the porcelain veneers for Dr. Lowe, the master impression was poured up in die stone and pinedexed to create individual dies. The veneers were then waxed into an incisal matrix (Figure 1) to ensure edge positioning. The wax-ups were then sprued, invested in a ring, and pressed using IPS e.max HT BL2 ingots. After divesting and cutting the veneers off the sprues, they were custom cutback and layered using IPS e.max enamel layering ceramic. After contouring, the veneers (Figure 2) were glazed and polished, then transferred to an uncut solid cast to insure a passive group fit.1-3

References

Figure 1. An incisal index created from the laboratory wax-up was used as a blueprint to fabricate the wax-up of the restorations to be pressed.

Figure 2. The lithium disilicate veneer restorations were fabricated in the dental laboratory.

Figure 3 is a preoperative view of Christine’s case. Note the incisal chip through the wax on tooth No. 8. The emergence angles and width to length ratios are acceptable even though this is an additive procedure.

Figure 5. This palatal preoperative view shows the flat labial surfaces and incisal wear to dentin on teeth Nos. 7 to 10.

Figure 6. A view of a no-prep veneer on a maxillary left cusp from the mesial aspect. Note the excessive cervical contour and large embrasure spaces. It is obvious from the excessive cement line between the porcelain and the tooth. Note the excessive cervical contour and large embrasure spaces.
result in a biologically and aesthetically pleasing result (Figure 7). Once the decision is made by the doctor and patient that an acceptable result can be achieved, an appointment for master impressions, interocclusal records, and face-bow transfer can be made.

After administration of intrapapillary local anesthesia, a double-cord retraction technique utilizing a No. 00, followed by a No. 1 braided retraction cord (Ultrapak [Ultradent Products]), is used in preparation for making the master impression (Figure 8). Upon removal of the top cord (No. 1) (Figure 9), a space is opened up that will allow the light-bodied impression material (Honigum [DMG America]) to flow into the gingival crevice, accurately capturing an impression of the intracrevicular tooth surface. When the impression is poured in die stone (Figure 10), the technician can now accurately construct the porcelain margins from an intracrevicular position and minimize any excessive contour of the restorative margin.

Case Delivery
The completed IPS e.max porcelain veneers are shown on the master model in Figure 11.

The first step in the delivery process was to do a collective try-in to evaluate proximal fit and overall aesthetics (Figure 12). The anterior 6 restorations appeared to fit passively; however, the premolar restorations could not be fully seated when the adjacent restorations were seated to place. This indicated that some interproximal adjustment would be required. Figure 13 shows an incisal view of the ceramic restorations on tooth Nos. 8 and 9 and shows the difference in facial contour and incisal edge position of the seated restorations as compared to the adjacent natural lateral incisors. It is clear that for most patients, a “no-prep” case will require all the teeth in the smile to be restored. Some clinicians have restored lingually positioned single teeth using the no-prep technique; however, to do this without creating overly-thick incisal edges is a challenge in itself.

Once the try-in was completed and the restorations were approved by the patient, the bonding process was started. I prefer to start with the maxillary central incisors, moving distally, placing 2 teeth at a time in order to ensure proper fit. While some clinicians espouse placement of all of the restorations at once, it is my opinion that doing so can result in severe problems with delivery of the restorations to the proper positions on the teeth. Many times, the supposed “passive collective fit” does not guarantee that during cementation process on the actual teeth, the fit will be entirely passive as well. Micromovement of the dies when fabricating the porcelain restorations can lead to a false sense of security regarding passive fit. Even a solid model does not guarantee that the collective fit on the patient will be accurate. It is not uncommon to have to do minor adjustments on the proximal surfaces of the cemented restorations to allow the next restorations to fit correctly, even though they appeared to have a passive fit at try-in.

After etching of the maxillary central incisors with 37% phosphoric acid (Pulpdent) for 15 seconds, the teeth were rinsed for a total of 15 sec-
Figure 23. A full-smile view of the completed lithium disilicate veneers (IPS e.max [Ivoclar Vivadent]).

Figure 24. A full-face postoperative view of Christine.

No-Prep Veneers... continued from page 00

Moving on to the maxillary premolar region, some difficulties were encountered during the seating process. Again, although these restorations appeared to have a collective passive fit on the laboratory models and at try-in, it did not work out that way at the delivery appointment. One of the problems as we progressed posteriorly was that the facial embrasures were smaller. Therefore it was more difficult to wrap the porcelain on the adjacent restorations into the proximal areas. It was also difficult to create a knife-edge ceramic margin, thus causing an imprecise fit of the restoration in that area (Figure 16). To correct the fit of the restoration on tooth No. 12 at placement, a dead-soft matrix band was placed in the interproximal area on the mesial aspect. After etching with 37% phosphoric acid, rinsing, and placement and curing of adhesive resin, the small area was filled using a flowable composite resin (Premise Flow [Kerr]) (Figure 17). The area was then finished and polished with composite finishing burs (ET3 [Brasseler USA]; TDF 3 [AXIS Dental]), discs (OptiDisks [Kerr]), and rubber abrasive points (Jiffy Points [Ultradent Products]). It is important to realize that this procedure is not “patching” an incompetent margin...there is no margin on the tooth surface for a no-prep veneer restoration. The small area is merely “sealed” with composite bonded to enamel to create a smoother proximal transition to the restoration to tooth structure. The next time, opening these embrasures slightly with an 8392-016 interproximal finishing diamond bur ([Brasseler USA]) would solve the problem (prior to master impression).

Another “embrasure issue” was encountered when attempting to deliver the restoration for tooth No. 4 (Figure 18). The small size of the facial embrasure did not allow the restoration to fully seat on the mesial aspect. To correct the problem, the distal surface of the cemented restoration was lightly adjusted in the contact area with a composite finishing diamond (ET 3 [Brasseler USA]) (Figure 19). Once the premolar restoration seated passively, the adjusted area on the distal of the seated restoration was polished with porcelain polishing abrasives (Dialite [Brasseler USA]) prior to placement of tooth No. 4 (Figure 20).

After all the all-ceramic restorations were delivered, the marginal areas were painted with a surface sealant (Seal-N-Shine [Pulpdent]) to seal any microscopic imperfections that may have existed (Figure 21). Since Seal-N-Shine’s “Embrace Technology” is reported by the manufacturer to be “moisture forgiving,” the material was brushed on all facial and palatal margins of the restorations, even intracrevicular margins, as well as any available interproximal margins, air-thinned, then light-cured (Figure 22). Finally, the occlusion was checked with Accufilm II (Parkell), and any discrepancies were identified and polished. Figures 23 and 24 show the postoperative full-smile and full-face views of Christine’s completed smile. She loved it so much and said, “Dad, when can we do the lower?” I said, “Christine, we will try tooth whitening first!”

MY FIRST NO-PREP VENNER CASE: A RETROSPECTIVE

I have always been skeptical about any procedure or product that makes claims that are too good to be true. A bigger problem is created when a credible procedure or product tries to be “everything for everybody,” rather than just sticking to what it does best. Marketing hype leads patients to believe that no-prep veneers are for everyone! No shots, no loss of precious tooth enamel, no painful impressions...we can even line them up in a tray, squirt in the cement, and place them all at one time! In my opinion, this same hype leads dentists to believe that no-prep cases are easier to impress and deliver than the prepared alternatives.

After completing hundreds of pre-

Table. 2010 Occlusion Analysis Codes and Fees

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<th>Description</th>
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CDT-2009/2010. Copyright American Dental Association. All rights reserved. Fee Data. Copyright Limoli and Associates/Atlanta Dental Consultants. This data represents 100% of the 90th percentile. The relative value is based upon the national average and not the individual columns of broad-based data. The abbreviated code numbers and descriptors are not intended to be a comprehensive listing. Customized fee schedule analysis for your individual office is available for a charge from Limoli and Associates/Atlanta Dental Consultants at (800) 344-2633 or visit Web site limoli.com.

Diagnostic Casts and Occlusion Analysis

Tom M. Limoli, Jr

Diagnostic casts are not a billable procedure code if you are fabricating a bleaching tray, mouth guard, or any other type of appliance or splint. With any type of appliance fabrication, the “working” models and castings are considered part of the construction process. Diagnostic casts are for diagnostic justification. They are/may be necessary to demonstrate as well as learn from the following:

- Fixed and removable prosthetic needs:
  - the level of the gingival attachment—rolled or knife-edged tissue margins
  - nonfunctioning teeth and traumatic occlusal discrepancies
  - the need for occlusal adjustment procedures or the need for more detailed occlusal analysis that may necessitate face-bow transfer to an adjustable anatomical articulator. The occlusal analysis or adjustments would be billed separately from the diagnostic casts, regardless of insurance coverage or denial.

As concerns code D9950, occlusion analysis of the mounted case, the procedure includes, but is not limited to, face-bow transfers, interocclusal records, tracings, and any associated diagnostic wax-up. The diagnostic casts are identified separately with code D0470.

The detailed analysis must be performed and billed prior to the rendering of any restorative or prosthetic care. This would be part of the treatment planning process. However, if any periodontal procedures are rendered, such as any additional periodontal therapy or any other treatment, the periodontal procedure is not billable.

Many benefit contracts specifically accept liability for the correction of occlusal imperfections only as adjunctive periodontal therapy. The old ADA codes of 04330 (limited) and 04331 (complete) had 4000-series prefixes to identify such treatment as associated periodontal therapy. Benefits may vary, but in general, benefit contracts pay for non-surgical initial therapy (04341).

The dental office must not allow patients to assume that their benefit plans will pay for all necessary care and indicated treatment. On the same note, dentists must always be aware of the underfunding of dental plans.

No amount of pleading or pressure by providers will allow changes to correct occlusal disharmonies prior to proper restorative and prosthetic care when such therapies are specifically not covered by the plan.
pared cases and only one no-prep case, it is my opinion that these “easy no-prep cases” are much harder to deliver successfully. The advantage of even a minimally-prepared case is that there is a definite marginal seat and no overall dimensional change. The best no-prep cases are those where nature has made the space already, such as diastema closure cases, microdontia (peg laterals), or excessive wear cases. All of these have been “prepared” in some fashion...just not by a bur. Patients who have normal width-to-length ratios, facial contours, crowded teeth, facially positioned teeth (filled buccal corridor) would not, in my opinion, be good no-prep candidates. Also, the all-ceramics that are most common with no-prep veneers are very thin, leucite-reinforced, and highly opaque, making the accomplishment of a high degree of texture and aesthetics very difficult, if not impossible, for dental laboratory technicians to achieve. Lithium disilicate is a highly aesthetic and extremely strong all-ceramic. Proper case selection and using this ceramic material shines a whole new light on the possibilities for the no-prep veneer case. In my mind, it was the perfect solution for my daughter’s case, and I treat all patients as if they were family!

Acknowledgement
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References

Dr. Lowe graduated magna cum laude from Loyola University School of Dentistry in 1982 and served there as an assistant professor in operative dentistry until its closure in 1993. Since January 2000, he has been in private practice in Charlotte, NC. He lectures internationally and publishes on aesthetic and restorative dentistry and is a clinical evaluator of materials and products. Dr. Lowe received Fellowships in the AGD, ICD, ADI, and ACD and received the 2004 Gordon Christensen Outstanding Lecturers Award. In 2005, he was awarded Diplomate status on the American Board of Aesthetic Dentistry. He can be reached at (704) 364-4711 or at boblowedds@aol.com.