inside Dentistry

[illegible] | VOLUME 5 • NUMBER 9
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PREP VS NO-PREP:
THE EVOLUTION OF VENEERS

CONTINUING EDUCATION

ENDODONTIC DIAGNOSIS: A 12-STEP PROCESS

PREP VS NO-PREP: THE EVOLUTIO

By Allison M. DiMatteo, BA, MPS

Patients and dentists alike are increasingly the target of marketing messages about no-preparation, thin, and/or minimal preparation veneers. Some of the information that may be conveyed is nothing more than over-generalized hype designed to get reluctant patients into the dental office, or to motivate dentists to use a new restorative product for their cosmetic case. One thing's for sure: the no-prep, thin, and/or minimal preparation veneer's time has come, and that's perhaps what's fueling all the fuss. After all, the age of conservative treatments and minimal intervention has dawned.

Interestingly, however, the concept or philosophy of a no-prep or minimal preparation veneer isn't new. In fact, it's more than 25 years old.

"We have come full circle. Veneers started out as primarily an additive technique and, as such, we know a great deal about their application and longevity," recalls Betsy Bakeman, DDS, accredited fellow of the American Academy of Cosmetic Dentistry. "Enamel substrates, when properly prepared, offer the most predictable surface in which to bond porcelain. Of course, not every situation that is suitable for no-prep veneers is entirely in enamel. The patient may have attrition of the occlusal surfaces into dentin or cervical erosion that exposes dentin. Therefore, the question about longevity should not be as much about how much the tooth is prepared but how much enamel remains."

So what exactly is involved with no-prep, thin, or minimal preparation veneers? According to Ed McLaren, DDS, director of the UCLA Center for Esthetic Dentistry, "the marketing would have you believe a specific product, but there are several products that can be used with this technique. It is really a technique."

While there is no consensus in terms of what defines a no-preparation veneer or a minimal preparation veneer, long-time evaluators of the porcelain laminate veneer modality—such as Mark J. Friedman, DDS, past president of the American Academy of Esthetic Dentistry—assert that either revolves around a philosophy of being conservative. This is despite the fact that, as McLaren suggests, there have been some commercial interests that have used

the concept of no-prep veneers to promote their laboratories and the materials that they market, he says. However, neither is material-specific.

"It's basically a technique or approach that's been talked about for many years, one that's consistent with our concept of minimally invasive dentistry and doing as little damage as we can," elaborates Terry Donovan, DDS, professor and section head of biomaterials at the University of North Carolina School of Dentistry. "There is no one specific product used for the technique, although some manufacturers market more aggressively than others. However, all dental laboratories that fabricate veneers will offer dentists no-prep or minimal-prep veneers."

The big question for Donovan is whether the no-prep veneer is suitable for all, or even most, patients, as implied by some advertisements. He says that the majority of patients that present requesting veneers require more preparation than is implied in the marketing materials for no-preparation veneers.

"I think the desire for dentists to avoid cutting away tooth structure is one thing that has precipitated this approach. I applaud the conservative aspect of it, and there are cases in which these types of veneers can be acceptably placed," notes Harald O. Heymann, DDS, MEd, professor and graduate program director in the Department of Operative Dentistry, University of North Carolina School of Dentistry. "However, I personally believe that a compensating reduction that is very minimal in its depth and ensures preparations in enamel is the way to go."

According to Strasseler, long-term research has demonstrated a 94% survival rate for minimally invasive porcelain veneers.[1] However, he also notes that while conservation of tooth structure (ie, no-prep veneers) is important, so is selecting the right treatment modality based on the clinical findings for each individual patient.[1] Therefore, when it comes to ensuring appropriate procedures, patients seeking esthetic treatment should undergo a comprehensive clinical examination that includes an esthetic evaluation.[1,2]

"What we need to do first is identify our goal for the case, and determine what the patient wants and what their expectations are as far as color, tooth position, size, shape, etc," says Dino S. Javaheri, DDS, a private practitioner in Danville, CA. "Then we need to look at where the teeth are right now and determine where they need to be. If we don't do a thorough job with case selection and treatment planning, then what will happen is the veneers will either look bulky, their colors will end up looking opaque, or the tooth position, size, or shape will not meet the patient's expectations."

Things such as the midline position and whether or not it needs to be moved, how, and by how much; lip fullness and the manner in which it might be affected by changes in the facial/lingual position of the teeth; incisal edge position, occlusion, and tooth shape; and desired color change and whether or not underlying color needs to be masked—all need to be considered and analyzed when determining ideal materials for veneer restorations. These factors also determine whether or not the patient's teeth can be left alone (ie, not prepared at all or prepared minimally) or will require tooth reduction to accommodate the anticipated restorations.

"It's important to take the patient's concerns and desires into account.

ON OF VENEERS

Bur Image Courtesy of KOMET USA

If the patient doesn't want to have any preparation done, fine," believes Michael DiTolla, DDS, director of clinical education for Distinctive Dental Seminars. "Perhaps we won't achieve the best esthetics we could, but if the patient is informed and willing to compromise, then he or she has the final decision about what will make them happy."

This month, *Inside Dentistry* presents readers with a comprehensive overview of what is meant today by no-prep, thin, and minimal preparation veneers. In doing so, a discussion will be offered of the development of the veneer modality, as well as its preparation designs. Practical issues surrounding case selection for the placement of these varieties of the veneer modality will be discussed. Guidelines also will be presented to facilitate treatment planning veneer cases.

WHERE IT ALL BEGAN

John R. Calamia, DMD, professor and director of esthetics at New York University College of Dentistry—and the one credited by many as the father of the porcelain laminate veneer—recalls that the development of the modality in 1982 was done with no or little preparation.[3] It was original research, and the process needed to be reversible in case it didn't work, Calamia says.

Initial patients were established for the purpose of trying those veneers on the facial surface of the tooth, without any preparation; making an impression; and placing the restorations. Those first veneers were about 0.5 mm in thickness, and they tapered down to practically nothing at the margins, Calamia recalls. For comparison, today's newer thin veneers claim thicknesses of less than 0.5 mm, but for the most part, they are closer to 0.3 mm as the minimum thickness, he says.

"There is no question that if we look back historically, the porcelain veneer was always, from its inception, designed and developed to be a very conservative approach to restoring teeth with porcelain on the facial aspect," explains Friedman. "The concept was to be extremely conservative to maintain an enamel substrate.[3]"

As Calamia's research progressed, what he and his colleagues observed was that with

STOP:

Indications & Caveats for No-Prep Veneers

According to John R. Calamia, DMD, there certainly is a place for the use of minimal prep and no-prep veneers in dentistry. What clinicians need to realize, and be willing to inform their patients about, is that this place is a very small part of what veneers can provide patients, he says.

Successful Spots for No-Prep Veneers

Most of the no-prep cases that Calamia has seen in publications are **diastema closures** involving space between teeth, which require little or no color change in those areas. For those types of cases, dentists probably could use a no-prep or minimal-prep veneer, he says. For that matter, some of the current composite resins, which for the most part would be just added to the surface of the patient's tooth, could also be used, Calamia suggests.

"In terms of its viability as a technique, I have utilized no preparation veneers, but it's very important that I have the right case type in which to place them," explains Michael R. Sesemann, DDS. "Usually it is a **lingually verted tooth** with perhaps a collapsed posterior segment where you're trying to **fill out a buccal corridor** and make a person's smile a little wider, or part of the dentition that can be treated with a purely additive technique."

"The concept of no preparation at all on the tooth really only works if a tooth is minimal in its dimension, such as with a **peg lateral**," believes Mark J. Friedman, DDS. "Here you can create a porcelain veneer that has the proper natural anatomy and confluence with the soft tissues without over-contouring."

However, Raymond Bertolotti, DDS, PhD, cautions that no-prep veneers for peg-shaped laterals and lingually tipped teeth can be challenging for dentists and laboratories when they involve ultrathin stacked veneers. These are the exception, not the rule, he says.

According to Michael DiTolla, DDS, using no-prep veneers comes down to matching the suitability of a proposed dental treatment with what the patient is interested in; but that said, no-prep veneers are not a cure-all.

"No-prep veneers may work well with other restorative dentistry being performed in the same case in order to offer patients the opportunity to **finish their smile** at the same time," suggests DiTolla. "For example, if an anterior bridge or anterior crown is replaced, no-prep veneers could be judiciously placed adjacent to these restorations so that everything blends, creating an easy way for a patient to finish off their smile."

Cautionary Caveats

Practicing clinicians and academics alike welcome a more conservative approach to esthetically treating patients, and all agree that preservation of enamel is key. However, they do have concerns related to the no-prep version of veneers.

Not Irreversible. Friedman advises dentists to make an accurate diagnosis, restore teeth when they need restoration, and consider more conservative treatments when appropriate (eg, whitening, microabrasion, orthodontics) and not think that veneers are completely innocuous. Even a no-prep veneer is going to require tooth preparation to remove it, he says. When the veneer is removed, the resulting tooth preparation may, in fact, leave the tooth always needing a restoration due to the lost tooth structure.

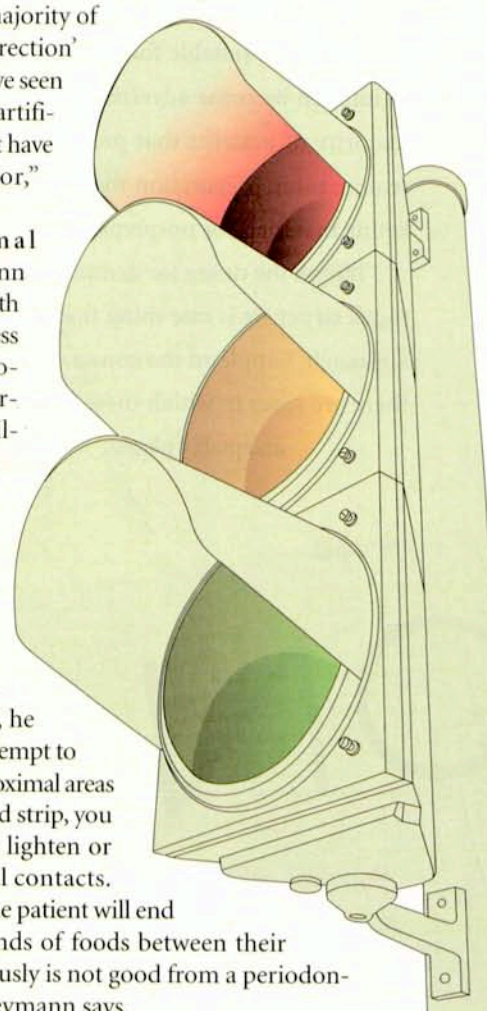
"A no-prep veneer, in my opinion, is not an innocuous and reversible procedure," believes Friedman.

Beware of Over-Contouring. Harald O. Heymann, DDS, MEd, warns that if a patient presents with otherwise normally shaped and sized teeth, there may be no way to avoid over-contouring the teeth without compensating reduction through some tooth preparation. He says that with no-prep veneers, there is no way to compensate for the additional thickness of the veneering material, so if the tooth is already of normal contour and size, then some degree of over-contouring will result, Heymann elaborates.

Gingival Response. As a consequence of over-contouring, one of Bertolotti's concerns with no-prep veneers involves the gingival response. "If the teeth are tipped lingually, dentists can achieve a nice margin and everything will be fine," Bertolotti says. "When a tooth is in the normal position and ceramic is added to it, there is potential for some gingival troubles from over-contouring and improper finishing."

Fragile/Delicate in Nature. Heymann says that if the veneers are actually made as thin as some manufacturers claim, which is as thin as 0.3 mm, they would be very difficult to handle and fracture would be a real possibility. "Even if dentists could successfully seat these veneers, polymerization shrinkage alone could potentially crack a veneer that's only 0.3 mm in thickness," Heymann explains. "The fragility of these veneers during try-in and cementation is certainly a source of concern because of problems with potential fracture."

Less than Desirable Color/Esthetics. Bertolotti's other concern with no-prep or minimal prep veneers is that with something so thin, a great deal of opacity is needed in order for the veneer to change the color of the tooth. "The vast majority of no-prep 'color correction' veneer cases that I've seen look very flat and artificial since they don't have any depth of color," Bertolotti says.



Interproximal Finishing. Heymann is also concerned with the inability to access the margins of no-prep veneers interproximally to facilitate proper finishing. When the margins are accessible, they can be smoothed and polished so that they are confluent with the contours of the tooth, he explains. "If you attempt to smooth the interproximal areas with just a diamond strip, you may inadvertently lighten or open the proximal contacts. The result is that the patient will end up catching all kinds of foods between their teeth, which obviously is not good from a periodontal standpoint," Heymann says.

the veneers that were placed without any preparation, the over-contouring of the teeth (ie, the change in the emergence profile) over time actually began to cause periodontal problems.[4] As a result, patients were then made aware in advance of the need for stringent home care in order to preserve the health of the gingival tissues, he notes.

"We then realized that these veneers were securely bonded to the enamel, and it was very difficult to remove them; they had to be ground off almost completely," Calamia remembers. "We began to have confidence in the veneer system as something that would be long-lived."

Calamia and his team then determined that, from a periodontal standpoint, it made sense to use a preparation, which would make room for the laminate veneer. The slight preparation he developed was a 0.5-mm reduction, with the 0.5 mm brought back, providing almost the original emergence profile of the tooth with the new veneer.

"Minimum preparation is what the porcelain veneer restoration initially evolved from. Because it requires a certain minimum thickness, the porcelain veneer can be fabricated at least 0.3 mm," explains Friedman. "If a tooth is in normal facial position with adjacent teeth, then you have to remove at least that 0.3 mm to 0.6 mm of tooth structure to prevent the tooth from being over-contoured.[5]"

Unfortunately, as the veneer technique became more widely used, a greater number of clinicians began to push the envelope, Calamia observes. They started to replace "whole parts" of the tooth, rather than working within the constraints of an individual tooth's enamel, he said. For example, some clinicians worked into areas beyond the cervical and onto the root surface. This was still a good technique in that most of the margins remained in enamel.

However, as preparations went deeper into the tooth, some of that dentin substructure was not as rigid as enamel, Calamia continues. With the enamel sub-struture now being changed to a dentin substructure, which has more motility and, in general, more flex, clinicians were placing a very rigid veneer on something much more flexible. That combination of rigid veneer and flexible substrate was the cause, over time, of fracture of some of the restorations, he explains.

"This was a time when we only had bonding agents in dentistry that had poor bond strengths to dentin," Calamia recalls. "These fractures usually occurred in crazing or cracking at a specific area, without the total loss of the restoration." Another problem occurred if a large segment of tooth was replaced with porcelain. In those areas where there was a transition in the restoration itself between a very thick area of porcelain to a very thin area, this too could, over time, cause fracture within the porcelain itself, he says.

Concurrent with the evolution of the veneer technique was the evolution and development of the materials used for the fabrication of these restorations. Stacked feldspathic porcelain was among the first used. However, as other types of porcelains (ie, pressable ceramics) were used, problems arose in terms of technicians' abilities to make those restorations in very thin thicknesses, Calamia recalls. As a result, the minimum reduction initially required for some pressed ceramics was closer to 0.7 mm to 1 mm. This was much greater reduction than the 0.5-mm reduction that was necessary for the original feldspathic porcelains.

"As a result of using a different product, we were now advocating deeper preparations and, again, going past the enamel and into the more flexible dentin layer of the tooth," Calamia explains. "Better bonds to dentin over the past 10 years have been a great help but did not fully compensate for this change in the substrate bonded to."

THE EVOLUTION OF MINIMAL PREPARATION DESIGN REQUIREMENTS

According to Friedman, as the veneer modality evolved from its original no-preparation state to one of slight preparation, a problem developed in that there was no clear definition of what a tooth preparation for veneers was. Did it mean touching a tooth with a rotary instrument to create a finish line? Or, did veneer preparations entail only roughening the tooth?[6]

"For some years a lot of us were doing no-prep veneers. I placed probably more than 100 of them in the early to mid-1980s, and they worked pretty well," remembers Raymond Bertolotti, DDS, PhD, clinical professor of biomaterial science at the University of California, San Francisco. "Then, we decided that a little preparation of the margin would be a good idea, and so we started doing that. Later, researchers found that tipping the incisal edge enhanced the strength, and that just preparing the facial surface of the tooth was not as strong as tipping the incisal." Specifically, an in vitro (bench-top) study by Castelnuevo, Kois, and colleagues showed that 2 mm of free-standing incisal porcelain and minimal facial preparation produced the strongest veneer design,[7] Bertolotti said.

Bakeman notes that there has been a variety of in vitro studies through the decades on the lingual chamfer with varied results. However, that information does not always transfer clinically, she says.

"Porcelain veneers in which the preparations remain in enamel are shown to have a high degree of long-term success regardless of the lingual preparation design," Bakeman says. "Again, an enamel substrate appears to be of key importance."

THE BONDED PORCELAIN VENEER SHOULD RETURN TO ITS ORIGINAL INCEPTIONAL ROOTS OF BEING A CONSERVATIVE ALTERNATIVE THAT IS ONLY ONE OF OTHER OPTIONS.

The original reason that veneers were developed was to have a very conservative method of restoring teeth that would offer an alternative to the use of full-coverage crowns, when appropriate, Calamia says. During the late 1970s and early 1980s, most actors and actresses were having full crowns placed, for which the reduction of tooth structure was almost three times more than needed for a veneer to achieve the same results.

"The whole idea was to have a very conservative, minimum reduction of tooth structure treatment that achieved the same results as a full-coverage crown," Calamia says. "In our studies over time, the veneer preparation in the enamel of the tooth probably had a lot to do with the longevity of these restorations, some of which have now been in the mouth for more than 25 years."

The introduction of pressed ceramics in the 1990s ushered in an era of more aggressive preparations, Bertolotti says. As mentioned previously, in order to fabricate pressed ceramic veneers, more room was required, thus necessitating a millimeter or deeper preparation.

"If you're going to press a ceramic of a millimeter or a little more, that's about the thickness of the enamel on the facial surface of the tooth. This resulted in the removal of all the enamel, preparing down into dentin," Bertolotti explains. "In my opinion, when you start breaking contacts, going through interproximals, and you're in dentin, I don't think that should be called a veneer. I think that should be called a reverse three-quarter crown."

In more recent years the motivation of manufacturers has been to move away from aggressive preparations and create esthetic veneer materials that attempt to minimize the invasion of dentin by being able to be bonded to enamel, Bertolotti says. Echoing sentiments stated earlier, he says that the profession has "come back almost to where we were in the late 1980s, except now we're using pressed ceramic, not brush-on feldspathics."

TO PREPARE, OR NOT TO PREPARE

When preparing teeth for veneer restorations, McLaren emphasizes that the most important consideration is the substrate, which ideally should be mostly enamel. While adhesive bonding to enamel is one of the obvious benefits of prep-less veneers, he says there is one problem with not slightly preparing enamel.

"Many teeth have a thin, amorphous layer highly rich in fluoride on the surface that does not etch as well as cut enamel," McLaren explains. "Therefore, at least sandblasting or very light enamel preparation is indicated. If you are bonding to mostly enamel and there is not an extremely high caries risk, bonded porcelain is the treatment of choice if there is a need for a restoration."

Today's veneers can be layered or pressed, McLaren says, with the same laboratory fabrication techniques being done for prepped or no-prep veneers. "The esthetic properties can be great for the right case with no prepping, but it is actually easier to achieve an esthetic result with tooth preparation, since it provides more space to work with color, characterization, etc," he explains.

While some welcome the more conservative approach to porcelain veneers that the no-prep veneers represent, there are concerns. For example, Heymann suggests that they are best placed in patients with undersized teeth and/or who have spaces between their teeth.

Further, Calamia cautions that when clinicians encounter teeth that are overcrowded, broken down, or have very dark staining, these are the types of cases that require a little more substance to the restoration and would require preparation in an esthetically pleasing and periodontally sound way.

According to Bertolotti, no-prep veneers offer advantages such as reversibility. However, he says the cases he's seen often present with technical problems, such as gingivitis or mediocre esthetics.

"Minimal preparation veneers are usually the preferred technique," Bertolotti says. "One key is to use stacked feldspathic

SOME CONSIDERATIONS FOR TREATMENT PLANNING THE VENEER MODALITY

"I think if we can achieve the esthetic results we want with a veneer and keep our preparations primarily in enamel, veneers are far better alternatives than crowns," believes Terry Donovan, DDS. "On the other hand, if the teeth are worn to a certain extent, sometimes we have to use crowns, and often we use a combination of crowns and some veneers, and which tooth receives what type of restoration depends on how much structure is left, as well as tooth position."

Such determinations, however, are predicated on the comprehensive examination that includes conversations with the patient about his or her goals and what they are willing to accept in terms of compromise (eg, esthetics) in order to preserve as much tooth structure as possible, explains Dino S. Javaheri, DDS. Some patients want perfection, so their expectations must be reviewed before treatment planning, he says.

"With veneers, whether minimal prep, no-prep, or conventional, it really is all about case selection," Javaheri says. "It's definitely not a one-size-fits-all that will cover every patient. Treatment planning has to be very case-specific."

Esthetic & Smile Design Considerations

Once clinicians have an understanding of what the patient hopes to achieve with veneers, it's important to evaluate the **midline position** of the teeth, Javaheri says. If the midline is off and no tooth structure will be removed, then the laboratory can't change that, he explains. So, if it's off before, and you do no prep, it's going to be off afterward as well.

He adds that **lip fullness** is another important consideration. If the patient has a thin lip and porcelain is added, he or she could feel like they're scraping their teeth against their lip. If somebody has a very thick lip, they won't notice additional porcelain or that the teeth have been built out, Javaheri says.

"With any veneer case, the **incisal edge position** is very important, but it is especially so with no-prep cases because we're moving it forward," Javaheri elaborates. "Additionally, when we alter the incisal edge position, it could affect the patient's speech."

Functional & Masticatory Considerations

"As with all restorative dentistry, the management of occlusal factors is extremely important. It is important to create an angle of guidance that does not create premature loading of the teeth during function," explains Betsy Bakeman, DDS. "The greater the degree of structural and functional compromises presented in the pre-operative situation, the greater the degree to which these parameters must be managed."

Tooth Size, Shape, & Color Considerations

What's important about the tooth size and shape lies primarily with the widths of the teeth, Javaheri says. If dentists are just adding porcelain and they're not reducing any tooth structure in between the teeth, they limit what the laboratory can do to change the size of teeth.

"If we have the two central incisors that are being restored and one is 1 mm larger than the other one, it will still be 1 mm larger than the other one afterwards if it is not prepared," Javaheri explains.

Preparation Considerations

There is no one technique of anything that works for every patient, explains Ed McLaren, DDS. When it comes to veneers, many times clinicians need to slightly lingualize teeth for the final esthetic result. This requires some preparations, he says.

Two other important esthetic considerations that will determine if a veneer can be prep-less, McLaren says, are:

1. Is it going to be additive (ie, do you want to increase the volume of the tooth esthetically)?
2. Is the shade of the tooth going to change? Note that you need 0.2 mm thickness of veneer for each shade grouping change (ie, A1 to A0 is one group; A2 to A0 would be two groups).

"The reality is that we have certain physical and anatomical limitations within which we can work and have something that, number one, looks good, but even more importantly, remains in what we call the confines of physiologic contours of the crowns," explains Donovan. "Teeth are made to be shaped a certain way, and if we don't prepare the tooth, then we're simply adding on to it."

Answering the earlier question of whether the case is additive and to what extent, or not, determines the need for preparation. Adding porcelain to the labial surface, or to the incisal edge, could result in over-contouring, Donovan says. As a result, most of the time in most patients, clinicians need to provide very specific preparations that allow for veneers that look good within the confines of physiologic contours, he believes.

According to Bakeman, situations that can accept additive-only protocols typically call for thin veneers to control bulk and minimize over-contouring. Thin veneers take advantage of the optical properties of the underlying tooth structure and, as a result, can be highly esthetic, she says. That of course requires the underlying tooth structure to be of an acceptable range and need minimal, if any, shift in color. The need to change color requires greater room for a variety of porcelains to facilitate a significant color shift.

"Certainly the design of the preparation is important. However, the most important factor to consider is the preservation of enamel. More extensive preparations have an effect on the flexure of the tooth, which can in turn have an influence in adhesive failures," Bakeman says. "Studies have demonstrated that adhesive failures, which in their early phases are not detected clinically, are quickly followed by catastrophic failures of the porcelain. While it may appear that the porcelain fractured and that was followed by an adhesive failure, the reverse is more likely to be true."

"The preparation of a virgin tooth is part of an overall treatment plan, and that doesn't come into play too many times in my geographical area," observes Michael R. Sesemann, DDS. "When it does, I've utilized on incisors both the overlap chamfer design and a butt joint coming off of the incisal edge, and both work really well with the incisors."

With canines, what influences his preparation design is the presence of significant previous dentistry, Sesemann says. When there are a number of Class 3 composites on anterior teeth or various areas of erosion or attrition, those factor into the preparation design when treatment planning and diagnosing a particular restorative solution, he says.

porcelain to achieve good esthetics in a minimal thickness, around 0.5 mm."

What's more, Friedman suggests that dentistry is witnessing a disturbing trend of trying to suggest to the patient population that a no-preparation veneer treatment is available, without fully disclosing what the long-term cost is. Sometimes replacements will be needed, since these restorations all wear out, and the replacement might require a crown, he says.[8]

"For example, if the esthetics couldn't be worked out and perfected and the veneers have been replaced a couple of times, by now the tooth has been prepared pretty heavily," Friedman explains. "Now it needs a crown, and we start going down that slippery slope of doing more and more dentistry as time goes on.[9,10]"

DIFFERENTIATING AMONG NO-PREP AND MINIMAL PREP VENEER MATERIALS

The concepts driving the techniques used for placing veneers today have come full circle, but still there may be questions concerning what differentiates a no-prep veneer from its otherwise conventional counterpart, of course beyond the obvious (ie, the extent of preparation and thickness of the veneer). For example, says Heymann, if you're comparing veneers fabricated from feldspathic porcelain, then the primary difference between no-prep veneers and those that are made conventionally would be the presence or absence of some compensating reduction through minimal tooth preparation.

Donovan suggests there isn't any difference. He sees the term "no-prep" as a marketing label designed to appeal to patients who would like to improve their smiles but are reluctant to undergo the kind of procedures required with typical restorative dentistry.

"The terms 'no-prep or minimal-prep veneers' refer to the technique of placing veneers on teeth with little or no preparation of the underlying tooth structure, as opposed to a specific product or brand," emphasizes Bakeman. "The confusion may arise from the fact that manufacturers have moved to meet the interest and enthusiasm of the public in no-prep veneers by branding products that are marketed to specifically satisfy their needs for minimally invasive protocols."

However, it's worth repeating that there is no brand that owns the technique, Bakeman

the Inside Look from...

Issue after issue, the feature presentations in *Inside Dentistry* deliver coverage of the relevant and thought-provoking issues affecting the day-to-day practice within the dental profession. The underlying concerns associated with this important topic could not have been brought to the forefront without the insights shared by our knowledgeable and well-respected interviewees. For their collective generosity of time and perspective, we extend our sincere gratitude.

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says. While a specific brand of veneer may incorporate a certain type of porcelain, the reality is that there are many types of porcelain that could do the job, she says. From a fabrication standpoint, the critical determinants rely heavily on the expertise and skill of the ceramist, Bakeman adds.

"In addition, these restorations are extremely delicate before they are bonded to the teeth. As a result, it can be anticipated that there will be a higher number of remakes due to fracture at the fabrication or delivery phase," Bakeman explains. "In the past this has been considered a part of the cost of doing business."

All of the materials and situations need to be taken into account by the practitioner in order to make a good choice, Friedman says. Certain patients are not good candidates for veneers at all. For example, whether they're thick or thin, veneers would not be successful in certain patients with very destructive occlusions or collapsed occlusal vertical dimension, or teeth that are undergoing very traumatic functional and parafunctional activity, he points out.[11,12]

Clearly the materials used for veneers have evolved and changed from feldspathic porcelains to pressed ceramics to newer, stronger modern formulations.

Stacked Feldspathic Porcelain. Michael R. Sesemann, DDS, president and accredited fellow of the American Academy of Cosmetic Dentistry, notes that clinicians have a greater ability to layer feldspathic porcelain and create esthetic presentations that can be highly variable and characterized. Alternatively, the feldspathic material enables dentists to retain the favorable appearance of desirable tooth coloration by allowing the creation of thin veneers that are very translucent and simply replace the enamel on the most superficial layers of the tooth, he explains.

Sesemann explains that feldspathic no-prep veneers are usually created in one of two ways: either on a refractory die or refractory cast, or through a platinum-foil technique (ie, the platinum foil is applied onto the die and the veneer is made on top of that foil so it can separate from the model).

When clinicians are faced with a tooth that is quite dark, with the underlying tooth structure discolored, the tendency is to make the restoration a little bit thicker in the porcelain in order to mask the discoloration. This is an example of a clinical situation indicating that the veneer can't be too thin, Friedman says. Here, as Heymann points out, compensating reduction can enhance the esthetic effects of the veneer, since it can be made slightly thicker to allow the incorporation of some opacious porcelain to improve the masking ability of the veneer.

Pressable Ceramics. According to Friedman, these veneers tend to be thicker due to the laboratory techniques used to produce the final ceramic restorations compared to the stacked feldspathic porcelain. Pressed ceramics have usually required more tooth reduction and have not been desirable as a true veneer, notes Bertolotti. Bakeman echoes this sentiment, noting that the stronger leucite-reinforced ceramics that can be milled and pressed have not routinely lent themselves well to thin veneer applications.

Lithium Disilicate. Recently introduced lithium disilcate materials have demonstrated the ability to be pressed in thin applications and show great promise in this area, explains Bakeman. The strength of lithium disilicate not only streamlines fabrication of thin veneers, but it also creates greater ease of handling at the delivery phase, in effect reducing the potential for fracture and subsequent need for remakes, Bakeman has observed.

PUTTING VENEERS INTO PERSPECTIVE

Friedman and others believe that while the porcelain veneer is a conservative restorative alternative, it is not the end-all, be-all of minimally invasive approaches to esthetic treatments. That said, he believes that from a philosophical point of view, the bonded porcelain veneer should return to its original inceptional roots of being a conservative alternative that is only one of other options.

"It isn't at the height of being conservative. It's closer to a crown than would be whitening, orthodontics, contouring, or microabrasion, which are other esthetic procedures. Direct bonding is certainly the most cosmetic procedure that's the most conservative that we have," Friedman elaborates. "All of these procedures are very minimally invasive. The porcelain veneer is not that animal, and I think we need to rethink the idea of placing a lot of veneer restorations on a patient."

Therefore, dentists need to assess the patient's clinical situation to determine what the patient wants, what they're really looking for (eg, color change, alternation of size/shape), Bertolotti says. If they're looking for a color change, then clinicians should think about tooth whitening instead of veneers as the first option, for example, he suggests. If they don't like the spacing of their teeth, then dentists ought to think about clear aligners (eg, Invisalign) or some other kind of orthodontics as a first option, rather than veneers, Bertolotti continues.

"Once patients understand the options and decide they don't want those, then we might consider the veneer option and make some modifications. Some teeth you just can't correct with bleaching or appliances, so those would be candidates for veneers," Bertolotti explains. "You need to do a smile analysis, or other times a wax-up or computer imaging to determine and show how things would look once they're changed."

Patients need to be told about their options for achieving the results they want, but many dentists overlook the more obvious and conservative bleaching and orthodontics and go right to veneers, which are tooth destructive, Bertolotti says. Other options should be ruled out first, he advises.

CONCLUSION

As Sesemann sees them, the minimal and no-prep veneers represent viable alternatives that, at their core, are supportive of the fact that enamel is a cherished human tissue with unique properties that cannot be duplicated after its removal. It should, therefore, be clinicians' primary goal in this day and age of conservative dentistry and responsible esthetics to preserve enamel at all times if possible.

"When you have enamel remaining on the tooth, you have retained a great deal of the biological properties of that tooth in terms of its resistance to deformation or stress, and when the tooth isn't changing shape underneath your porcelain restorations, that tooth is more amenable to a successful future," Sesemann asserts.

Heymann concurs, emphasizing that the key to success with porcelain veneers is to use intraenamel preparations, or in the case of no-prep veneers, obviously, to bond to enamel. After all, once the preparation moves into the dentin, problems could arise that include debonding, marginal discoloration, sensitivity, etc, he says.

"The majority of problems encountered with porcelain veneers result when the preparations are extended into dentin.

AS PREPARATIONS WENT DEEPER INTO THE TOOTH, SOME OF THAT DENTIN SUBSTRUCTURE WAS NOT AS RIGID AS ENAMEL. THE COMBINATION OF RIGID VENEER AND FLEXIBLE SUBSTRATE, OVER TIME, WAS THE CAUSE OF FRACTURE OF SOME RESTORATIONS.

Research results are unequivocal on this contention. Bonds to enamel are far more predictable and exceedingly more durable than those to dentin. Therefore, regardless of whether you use a conventional veneer preparation or a no-prep veneer, you are better off to bond to enamel as a substrate as opposed to dentin," Heymann advises.

When it comes to determining whether a no-prep or conventional veneer is appropriate, the importance of case selection cannot be overemphasized, says Javaheri. Clinicians should not approach patients with a preconceived notion of what technique they're going to use, but first identify the patient's goals and objectives and, based on their clinical situation, work backwards to determine what technique fits the patient, he explains.

The specific problem that patients have should be addressed intelligently by the dentist who is providing treatments, in terms of why they are using specific products or why they're going in a specific technique direction, Calamia asserts. Unfortunately, some of the advertising about today's veneer choices goes directly to patients and, as a consequence, some patients present with requests for specific treatments that may or may not be appropriate for their situation, he says.

"The ethics involved in providing enough information to patients regarding what their specific needs are, really should be pushed in continuing education," Calamia says. "There should be more courses for dentists on ethics and the differences in materials, as opposed to so many courses geared to bringing patients in and selling cases."

According to Friedman, even though clinical research and this esteemed panel of experts agree that natural dental enamel is important to long-term dental health, an obvious dichotomy still exists.

"On the one-hand, bonded veneers can be performed with outstanding precision to preserve as much natural tooth structure as possible. However, just because a patient requests a restorative procedure, it may not be appropriate for the long-term health of their dentition," Friedman asserts. "Maybe the most difficult thing I have learned about the bonded porcelain veneer restoration in the past 25 years is learning to tell patients "No!'"

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