Two Viewpoints on Prepared

*jCD* is pleased to offer readers a discussion on the issue of prepared and “prep-less” veneers. Here, Drs. Brian LeSage and Dennis Wells address some “myths vs. realities” regarding these two treatment modalities.
Realities

Veneers and Prep-Less Veneers

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Introduction

Lack of clear-cut guidelines for veneer preparations has led to myths and misunderstandings. Veneers originally were introduced as conservative, additive restorative methods for which little to no preparation was required.¹² Feldspathic veneers were layered very thinly and could be placed conservatively, directly on enamel, and without significant removal of tooth structure.³

The veneer technique evolved to emphasize not maintaining tooth structure, but accommodating material requirements to satisfy esthetic and strength demands, and maintaining the convenience of the laboratory model. As new materials compensated for shortcomings in the strength of feldspathic veneers,³ laboratories embraced familiar waxing techniques, despite the more aggressive tooth reduction necessary (i.e., .75 mm or more) to ensure natural emergence profiles and esthetic nuances.⁴⁶

Figure 1: Preoperative retracted view showing diastemas, slight rotations, and asymmetries. Orthodontic treatment was declined even after an Invisalign work-up and ClinCheck.
Myth vs. Reality
The myth that prepared veneers need to be .75 to 1 mm in depth, which leads to exposed dentin, has contributed to over-preparation in many cases. Yet it has been customarily accepted as convention, even though today’s pressed veneer options now can be made very thin.

The reality is that individual cases and their respective clinical criteria dictate material selection and preparation requirements, with different indications requiring different veneers, materials, and preparation designs. There is no one universal standard.

Proposed Classification System
Currently under peer review is an article detailing a new veneer classification system introduced by this author to clarify the gray zone between conventional veneer preparation and no or minimal-preparation veneers. This system is briefly addressed here. The four-class metric (CL-I through CL-IV) helps quantify tooth structure removal on a case-by-case basis. Although minimal to no preparation is the goal, it is not always ideal or possible.

For example, even with “prep-less” veneers, many ceramists prefer a loupes-detectable finish line to clarify porcelain margins and facilitate seating of the veneers. Such a nearly imperceptible preparation (CL-I) is easily accomplished using a bis-acrylic preparation guide made from a putty or silicone matrix of the diagnostic wax-up that is then placed on the teeth7,8 (Figs 1 & 2). Depth cuts of .5 mm are placed into the incisal and facial aspects of this guide (Fig 3), resulting in the depth-cutting bur often not even touching or barely touching enamel (Figs 4-6). This leads to a preparation that only removes aprismatic enamel, minimizing potential for over-preparation, and creating a nearly undetectable finish line (Figs 7 & 8).

This preparation design—as opposed to the more aggressive .75 mm to 1 mm, is possible and ideal when patients present with no exposed dentin, 95 to 100% enamel remaining, and/or peg-laterals, genetic anomalies that lead to smaller teeth, short and worn teeth, or orthodontics that lead to narrow arches, or larger lips. Such minimal preparation may not be ideal if significant shade alternations, correction of axial inclination, or gingival symmetry and proportion irregularities exist.9,10 Additionally, veneers placed with no preparation have been shown to contribute to periodontal problems as a result of over-contoured teeth that change the emergence profile (Fig 9).11,12
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A minimally invasive or "modified prep-less" veneer design (CL-II) may be appropriate when 80 to 95% enamel remains, with only 10 to 20% exposed dentin. Depth cuts are still limited to .5 mm, although the gingival margin may consist of slightly more dentin to establish a clear margin.13

Both preparation classes enable dentists to achieve optimal bonding, which occurs when the substrate is enamel as opposed to dentin. Long-term enamel bonding success makes no-preparation and minimal preparation veneers the preferred treatment.1,9,14,15 To successfully bond veneers, 50% or more enamel must remain, 50% of the bonded substrate must be enamel, and 70% or more of the peripheral margin must be in enamel.4 The cingulum and lingual marginal ridges should be preserved, since these provide more than 80% of the tooth’s strength.4,16

Conservative veneer preparations still can be realized when 60 to 80% enamel volume remains and 20 to 40% dentin is exposed. Tooth reduction may range from .5 mm to 1 mm and, although the gingival margin will typically involve more dentin because there is more room for restorative material,13 more than 70 to 80% of the finish line must still be in the enamel (CL-III).

The universally accepted full-veneer preparation design (CL-IV) consists of approximately 50% enamel volume remaining, more than 40% exposed dentin, and 1 mm or more of reduction. The peripheral margin may consist of only 50 to 70% enamel. Functional and esthetic limitations of this veneer preparation design include lower fracture loads and decreased marginal accuracy that contribute to restorative failure.17,18 Preparation design and fatigue influence the marginal accuracy of veneers, with significantly higher marginal gap formations developing in complete veneer preparations.18,19

Summary
Veneers and their preparation designs are predicated on space requirements, working thickness, or material room; volume of enamel remaining; enamel periphery; and percentage of dentin exposed.3,4,7,8,13,16 These parameters dictate material selection and, therefore, preparation requirements, based on tooth color, position, function (centric-relation mounted models, vertical dimension of occlusion, envelope of function), stress analysis; and patient expectations. Such case-by-case variations in preparation requirements debunk the myth that veneer preparations must be .75 mm to 1 mm in depth.

References


Introduction

One of this author’s first articles on no-prep veneers was called “Prepless Veneers—Ridiculous or Reality?” The title is still relevant today, as opinion leaders continue to state their views in lectures and journals with a broad range of conflicting beliefs—most with a great degree of skepticism. It is the author’s position that refined techniques, new and improved materials, and better training in emulating nature have enabled “prep-less” veneers to rival (or in some cases, even exceed) traditionally prepared veneers in overall beauty and natural appearance.

Figure 1: Prep-less (DURAthin; Brentwood, TN) veneers, ##5-12.
Myths vs. Realities

Myth
Without preparation of the teeth, the porcelain margins will be inappropriate, causing unhealthy tissue, poor emergence profile, and detectable margins.

Reality
Prep-less veneers, when managed properly, can have biologically sound and optically beautiful margins and emergence profiles (Figs 1 & 2). In fact, of all the potential issues with prep-less veneers, the marginal area and emergence profile have become the least of this author’s concerns. This is because with proper fabrication and post-cementation finishing, one can create an “infinity margin.” Not only is this margin biologically sound, but it also is difficult to visibly detect as the ceramic feathers to the tooth surface (Fig 3). To achieve an outstanding result, dentists must be comfortable finishing porcelain in the mouth; this causes concern for many. However, materials and techniques have evolved to an extent that this can be readily accomplished. The fact that most ceramists currently hand finish the restorations with rubber wheels and brushes as opposed to oven glazing affords dentists the opportunity to accomplish similar results in the mouth provided certain precautions are taken. For example, careful attention must be paid to keep constant air on the teeth to avoid overheating, while liquid dam and special retraction instruments are utilized to prevent trauma to the tissue (Figs 4 & 5).

The ability to recontour and refinish porcelain after cementation opens up a whole new range of possibilities, as the minimum fabrication thickness of .3 mm can now be reduced even more—perhaps to as thin as .2 or even .1 mm. At this thickness, it is difficult to visually detect the increase in volume and the interproximal contours can be reduced to a pleasing level. Some would argue that just to minimally reduce the enamel makes much more sense and makes the outcome easier and more predictable, and in select cases this author would agree. However, there are some potential factors that may need to be addressed:

- The patient may refuse any drilling of their teeth.
- The average thickness of enamel at the cervical area of anterior teeth is .3 mm, and thus any enamel removal can significantly darken the tooth by removing the enamel “filter.”

It is very difficult for thin porcelain to adequately mask the influence of the darker dentin once some of the enamel filter has been removed; on the other hand, it is shocking how much a .1 to .2 mm of “extra” filter (porcelain) can brighten a tooth when no preparation is done. Minimal preparation will generally ease the burden of establishing ideal contours, but it can significantly increase the shine-through issues and make the margins more detectable.
Myth
Thin, prep-less veneers break easily and are not as durable as prepared veneers.

Reality
Thin, prep-less porcelain veneers are very strong and durable once bonded to 100% enamel; they have as good as or better long-term results than prepared veneers.

Porcelain bonded to 100% enamel produces a strong, durable interface that has been well documented for more than 25 years. Although porcelain does tend to be stronger as it increases in thickness, overwhelming success has been achieved with .3-mm (or less) thick ceramic veneers. Prior to bonding to enamel, thin veneers are indeed more vulnerable to fracture and thus extra precautions should be taken, but once bonded in place with current total-etch techniques the strength is profound (Fig 6).

Another distinct advantage of the prep-less approach in regard to durability and wear is that the “additive only” veneer is outside the existing envelope of function. This fact generally minimizes the stresses placed on the veneer and improves the success rate of the porcelain. The 100% enamel bond, coupled with absolutely no encroachment of the envelope of function, provides the basis for prep-less veneers to be very stable and long term even when they are very thin.

Myth
Prep-less veneers lack color and translucency.

Reality
Prep-less veneers can offer beautiful, lifelike color and translucency, simply by serving as an extension of the enamel filter.

Utilizing feldspathic powders, an unlimited amount of opacity and translucency can be introduced into each restoration based upon the desired outcome. It is an entirely different strategy to build a thin “enamel extension” as opposed to recreating a “missing” part of the tooth that has been over-prepared. With prep-less veneers, the warmth of the gingival one-third will automatically be created as the veneer thins and becomes highly translucent. In most cases it is not necessary to add darker color in this zone as is often done with prepared veneers (Fig 7).

The mid-body area of the veneer at .3 mm of thickness or more can dramatically shift the color of the tooth, provided none of the original enamel has been removed. Contrary to popular belief, the opacity can be increased a significant amount without making the tooth look “dead,” provided the veneer is relatively thin, and the end result can be a major color shift with very thin porcelain coverage. The key to a great color result is no preparation of the enamel, as even a slight reduction can create darkness that is difficult to overcome without excessive opacity or thickness of the porcelain.

The incisal edge can be managed in a variety of ways to create natural optics. If the teeth are lengthened (as is usually the
When an increase in volume is desired or can be tolerated, prep-less veneers are an incredible service to offer to patients, with multiple benefits and minimal risks. Much like medicine, dentistry is steadily moving toward less invasive procedures and this trend is not likely to change.

References


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Disclosure: Dr. Wells is the co-developer of DURAthin Veneers.