Myths vs.

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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Figure 1: Preoperative retracted view showing diastemas, slight rotations, and asymmetries. Orthodontic treatment was declined even after an Invisalign work-up and ClinCheck.

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.[1,2] 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.[4-6]

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 teeth[7,8] **(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]

Figure 2: Bis-acrylic placed on unprepared teeth using a putty matrix made from the diagnostic wax-up as a preparatory guide. Demonstrates full and final contour of definitive minimally invasive porcelain restorations.

Figure 3: Depth-cutting grooves using a .5-mm depth-cutting bur directly into the bis-acrylic. Red and blue pencil lines are placed in grooves for ease of visibility.

Figure 4: Bis-acrylic preparatory guide removed from ##6-8, showing minimal reduction to enamel to achieve diagnostic work-up result.

Figure 5: Bis-acrylic removed from ##6-11. Note some areas have not even been touched; no preparation was needed in those zones except to be contiguous with the remaining preparation.

Figure 6: Occlusal view showing depth-cutting grooves. No area has even .5 mm of prepared enamel.

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.

Figure 7: Final preparation to allow for diastema closures and rotations. There is no dentin exposure with the aid of preplanning and a bis-acrylic preparatory guide.

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.[3,4,7,8,15,16] 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.

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Figure 8: All-porcelain restorations on ##6-11 showing desired esthetic outcome. This outcome is expected when bonding exclusively to enamel and with minimal preparation with gingival health in mind.

Figure 9: Retracted image demonstrating esthetic and gingival health issues that can arise with improper diagnostic and esthetic planning with prep-less veneers.

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

Introduction

One of this author's first articles on no-prep veneers was called "Prepless Veneers—Ridiculous or Reality?"[1] 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 2: Prep-less veneers, ##5-12. Note the pleasing emergence profile and excellent tissue health.

Figure 3: Feathered "infinity" margins at 1:1. Note undetectable margins and excellent tissue health.

Figure 4: Zekrya retraction instrument (DMG America; Englewood, NJ) used to protect tissue while finishing.

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)**.[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."[3]

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.

Figure 5: Liquid dam used to protect tissue during final polishing.

Figure 6: Five-year recall of prep-less veneers, ##5-12, demonstrating excellent durability and stability.

Figure 7: Prep-less (DURAthin) veneers, ##5-12. Note inherent warmth of color in the gingival one-third.

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.[4] 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.[5] 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.[6] 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

Figure 8: Composite prototypes, ##5-12.

case with prep-less veneers), then the porcelain extension will often have more light transmission and thus create a subtle incisal translucency with no additional effort. On the other hand, effects can be layered in using incisal powders as with traditional prepared veneers, with similar results. If the teeth are not lengthened, it is often possible to either decrease the thickness or decrease the opacity in the incisal zone and allow the tooth's natural incisal effects to shine through. It may be counter-intuitive, but it is definitely possible to achieve beautiful, polychromatic color with thin, prep-less veneers.

Myth

Prep-less veneers are easier and faster than conventional veneers; therefore, the fees should be lower.

Reality

High-quality prep-less veneers are often more difficult to achieve than conventional veneers—it is not an easier, less expensive procedure when done well.

Emulating nature and creating Accreditation-worthy cases are not easy tasks with any approach, but they can be especially difficult to accomplish with prep-less veneers. Additive-only restorations require an in-depth understanding of facial contours by both the dentist and the ceramist so that the intentional increase in tooth volume does not appear bulky and inappropriate. To this end we create custom composite prototypes for each case that are hand-sculpted and spot-etched. These prototypes allow both the patient and the dentist to visualize the end results while at the same time confirming the feasibility of an additive-only approach **(Fig 8)**. This is not an easy technique and it does take a considerable amount of time. More time is also required when compared to prepared veneers in seating the case due to the inherent need to finish the margins and refine contours.

No-prep dentistry is not an easier, quicker, or cheaper service, but rather a minimally invasive approach to smile design that has a premium value to many patients.[7]

Conclusion

By definition, prep-less veneers are an additive-only procedure and thus the final outcome will reflect a net gain in volume and size of the teeth. This is not necessarily a negative, as in fact some teeth need an increase in volume and size. Examples of this include:

- microdontia
- loss of enamel due to wear, abrasion, and erosion
- an excessively large frame (lips) that creates an imbalance between the frame and the teeth.

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.

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