Ceramic Microlaminates

Extremely thin veneer can be fixed over natural teeth to solve esthetic problems and preserve healthy dental structure.

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The past few years have brought on an explosion of new dentistry materials and techniques. Ceramic laminates used for veneering teeth allow dentists to copy dental contour and shape, improve resistance, and enhance appearance. The choice of composite resin veneers or porcelain veneers rests on tooth preparation and a variety of applications.\(^1\) The goal in each case is to use a conservative procedure that preserves healthy tissues while providing the desired esthetic effect.\(^2\)

Clinicians should strive to preserve the integrity of the natural dentition and tooth structure during restoration preparation.\(^3\) Today's esthetic treatments allow minimal wear of the patient's own teeth. Bonded porcelain veneers can distribute stress from occlusal force and mastigation.\(^2\)

Ceramic microlaminates are an extremely thin veneer that can be fixed over natural teeth either without preparation or with minimally invasive preparation. Specific surface preparations are executed over both structures—tooth and ceramic—using acid, silane, an adhesive system, and resin cement. This method of restoration, which is able to provide microlaminates greater ceramic resistance and improved esthetic results, can be used to solve such esthetic problems as diastema; inappropriate tooth contours, size, and form; small color alterations; and others. It allows a healthy dental structure to be maintained during the execution of planning and making the treatment choice.\(^4\)

Also, an additive-reductive wax-up is important in determining the exact amount of dental structure that needs to be removed in specific areas and where ceramic should be added in other areas. A diagnostic wax-up can enhance the predictability of treatment by modeling the desired result prior to treatment. It is crucial to correlate the wax-up to the patient to avoid a result that appears optimal on the casts but does not correspond to the patient's smile or wishes.\(^5\) Moreover, the quality of communication between the clinician, laboratory technician, and patient regarding the fabrication of esthetic restoration improves when using wax-up, mock-up, stone models, photography, and shade descriptions\(^6\); silicone guides make it easier to check spaces and provide exact execution of planning.

The preparation technique itself is not complicated because, typically, no preparation is necessary. Sometimes a minimally invasive preparation is done in the form of rounded angles, which opens small diastema to improve the microlaminate's adaptation. However, treatment planning is crucial for optimal function and esthetics. While minimal invasion is important, sufficient space must remain for the appropriate porcelain build-up.\(^7\) Magnification, therefore, is mandatory for achieving a regular, smooth surface to permit checking the minute details before making the impression.

In the laboratory, damage to the fragile materials must be avoided. A microscope's magnification and superior light improve the technician's view, making damage less likely.

Knowing the optical properties of ceramics enables clinicians to make the appropriate choices for various esthetic challenges. Because ceramics with higher strength tend to be more opaque, dental ceramics with high translucency should be reserved for clinical applications in which high-level esthetics is required and the restoration can be bonded to tooth structure.\(^8\)

No material can be used in all situations. The translucent systems, either sintered feldspathic or pressed ceramics, are most widely applicable because they can be bonded to the tooth structure and because of their clearness. When choosing the material, particularly for the anterior region, take into consideration the laboratory technician's experience and expertise.\(^8\)
Case Study
As this clinical case illustrates (Figure 1 through Figure 22), the patient’s expectations were met while also preserving the greatest amount of healthy dental structure. This patient did not have a left lateral incisor, and her canine was transformed into it. The canine received a traditional laminate preparation whereas the temporary tooth next to the left canine was untraditional. When one type of tooth is transformed into another using restorative techniques, special care must be taken to correctly prepare and design the gingival contours to create the illusion that the teeth are in their correct positions.²

All of the other teeth received untraditional preparation using a conservative procedure and minimal wear. Before the preparations were started, bleaching was done. During preparation specific burs were used to wear down the healthy dentition in predetermined areas, and disks were used to polish them; rubber points were used in most of the areas.

The esthetic pre-evaluative temporaries and silicone index provided the best esthetic, phonetic, and functional outcomes and allowed for better communication with the patient and the laboratory. Diagnostic provisionals also aided communication, giving the patient the chance to evaluate the esthetics, function, and phonetics herself and with her immediate circle of family or friends.¹⁰

After the wax-up study was concluded, the provisional microlaminates were fixed in a unique part where all elements were linked. A session of images was completed, and it was observed that the central incisors were not as harmonious as had been hoped. Therefore, ceramic was added to the final restoration to achieve an almost over-contoured surface, which added "body" in these teeth.

After cementation it was possible to note the integrity of the soft tissue, and there was no bleeding after cord-retractor removal. These results can be noted when magnification is used. Quality of light is important to achieve flawless adaptation of microlaminates. Another key consideration when working with thinner laminates is that each step of clinical and laboratorial elaboration must be completed using precise and accurate movements and correct handling. In this way, a microscope might be used to improve each clinical and laboratory step. The author has frequently used magnification in her clinical routine, which is mandatory to achieve the best results.¹¹⁻¹⁵

In this specific clinical case, microlamination showing excessive gloss on each surface and the removal of shine was achieved using rubber points.

After cementation has been completed, microlaminates may present cracks or microcracks that could be caused by shape preparation or cementation processes, both of which need to be considered because the shrinkage is related to shape preparation and cement contraction. According to Magne et al, cyclical thermal fatigue has occurred when the luting composite is too thick or if cracks appear in ceramic porcelain laminates. The ratio of cement thickness to luting composite appears to have a relevant influence on the stress distribution in porcelain laminates.¹⁶

It should be noted that the preservation of healthy teeth is the most important aspect in these cases. The observation of the patient will be necessary for obtaining information about clinical behavior regarding these microlaminates in the coming years.

Conclusion
When working with a thinner ceramic structure, the manipulation of it is a key factor. Initially, dentists must pay special attention to rounded angles, promoting a smooth surface through use of disks and special polishing rubber points. From the moment that these laminates are received from the laboratory, extreme care must be taken to avoid cracks and superficial fractures. Microlaminates do not resist major stress before the cementation. During cementation, flowable resin or flowable cement is used and a little pressure is applied to fix the microlaminates. Magnification must be used to enable exact clinical steps.

Though all of these aspects are important, the preservation of dental health is the main point that needs to be observed. While conservation of tooth structure is vital, it is also imperative to select the right treatment modality for each patient based on clinical findings. Finally, the difficulties encountered with ceramic microlaminates are justified by the beauty of the smile achieved through the preservation of teeth.
References


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