

TECHNIQUES & MATERIALS

Utilizing Laser to Remove Ceramic Veneers

By Ricardo Mitrani on April 9, 2019 | [comments](#)

Figure 5

One of the toughest challenges when replacing old ceramic veneers is ensuring that we do not remove sound tooth structure, which is what normally happens when we use conventional protocols utilizing high-speed hand-pieces and diamond burs for veneer removal — as it is nearly impossible to avoid unnecessary sound tooth removal, even when operating with magnification.

A great alternative that has been recommended for some time now is to utilize laser units. They effectively degrade the bonding interface (adhesive resin) with hydrolysis of the water in the resin cement, which leads to easy removal of the veneer.

Debonding mechanisms that cause the adhesive resin to degrade by laser energy were explained by Tocchio et al in 1993. When he published an article on debonding orthodontic brackets utilizing laser unit, he referenced the terms “thermal softening,” “thermal ablation” and “photoablation.”

Morford et al utilized the Fourier Transform Infrared Spectroscopy on 10 flat veneer samples (IPS Empress Esthetic, e.max Press HT) to assess which infrared laser wavelengths transmit through a veneer. Additionally, Fourier Transform Infrared (FTIR) spectra for bonding cement were obtained.

Consequently, Er:YAG laser energy transmission through different veneer thicknesses was measured. The energy necessary for debonding was determined and then the veneers were debonded with the laser. The time needed for total debonding was measured and possible damage to the underlying tooth structure was assessed by light microscopy.

While the veneers did not show any characteristic water absorption bands in the FTIR, the bonding cement showed a broad H₂O/OH absorption band. The Er:YAG laser debonding protocol utilized was the “scanning method,” which is considered the ideal method of choice, and the fiber tip was positioned at a distance of 3-6 mm from the veneer surface. So the study suggests that utilizing the Er:YAG to maintain the veneer integrity possibly depends on the flexure strength of the veneer porcelain.

A recently published comprehensive review of the literature revealed that utilizing the laser is effective without the collateral damage of the remaining tooth structure. Nonetheless, further well-designed controlled clinical trials and longitudinal prospective studies are needed to determine the precise laser parameters and duration of irradiation that could be used for removal of ceramic restorations with varying thicknesses.

We have been successful utilizing the Waterlase iPlus (Er,Cr:YSGG) with the following settings (4 watts/ H mode/ 20 pulse/ 25 water/ 30 air) utilizing a turbo hand-piece with the MX9 tip (Fig 1). It is important to mention that we regularly alter these settings based on the material of the veneer, the thickness and clinical observation.



Figure 1

We have so far experienced three different outcomes with this procedure:

1. Clean cut removal

Essentially the old veneer literally pops out intact, so that it potentially could be bonded back in place if needed. (Figs. 2-6)



Figure 2



Figure 3



Figure 4



Figure 5

Conversação ao vivo



Figure 6

2. Crack removal

This mode of removal essentially allows the dentist to remove large fragments through crack propagation but disables the utilization of them in the future. (Figs. 7-9)



Figure 7



Figure 8



Figure 9

3. Shatter removal

This response to the laser often means that the ceramic shatters and it takes longer for us to remove the veneer, but it allows us to do so without compromising the substrate. (Figs. 10-11)



Figure 10



Figure 11

For some time now it has been recommended to utilize laser units for this purpose to obtain great results, as the old veneers either pop out completely or crack and the pieces can be easily removed. In some cases, the old veneers "disintegrate" until the resin cement is evident.

Once the veneer has been removed completely, then a high-speed hand piece and a fine stripe diamond bur are used to completely remove the underlying cement layer and expose fresh enamel/dentin for the future veneer.

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