QUICK TECHNIQUE

Improving Restorative Dentistry With Hard-Tissue Lasers

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Patients often avoid dental care due to the perceived pain that they will feel either related to the local anesthetic injection or drilling to remove caries. This can be especially traumatic for pediatric patients, who can be uncooperative following the sensation of the injection. Hard-tissue lasers allow treatment without the need for local anesthetic or the dental handpiece to remove caries, thus providing a much more comfortable experience for the patient. This allows a practitioner to remove carious tooth structure while preserving healthy enamel and dentin for truly minimally invasive dentistry. The literature supports the more native tooth structure preserved, the better the prognosis for that tooth long-term.

Lasers are becoming a standard feature in the dental office, enhancing treatment in both hard- and soft-tissue applications. Diode lasers (ie, Picasso [AMD LASERS, Indianapolis, Ind]) are designed for soft-tissue applications. Er:YAG lasers are suited for use in hard-tissue treatment since the wavelength they operate with (2,940 nm) has an affinity for hydroxyapatite and water. Diodes, at 810 nm, have an affinity for hemoglobin and melanin, making them ideal for soft-tissue applications. Although an Er:YAG will cut soft tissue, diodes cut soft tissue a little faster and have better coagulation benefits.

Er:YAG hard-tissue lasers such as the Lite Touch (AMD LASERS), when utilized for caries removal, frequently can be utilized without local anesthesia since the laser is used in a noncontact mode and has a desensitization action on the odontoblastic fibers in the dentin. Vibration normally felt when a bur in a handpiece contacts the tooth is eliminated along with the sound of the dental drill. The resulting preparation due to the lack of vibration of the bur results in no microfracturing of the surrounding enamel. As the laser ablates both dentin and enamel without leaving a carbonized surface behind, no smear layer results on the treated dentin surface, as is found when a bur is used to prepare the tooth (Figure 1). Additionally, a bactericidal effect results on the dentin, leaving a sterile surface within the tooth to accept the bonded restoration that will be placed. This may decrease pulpal flare-ups that can lead to tooth sensitivity and the possible need for endodontic treatment by elimination of the residual bacteria on the dentin surface. Treatment of the enamel margins with the Lite Touch laser yields a surface that has an enhanced bondable surface without the need for acid etching since the Er:YAG removes the prismatic substance around the rods to a greater degree then the rods themselves (Figure 2).

When sealants are treatment-planned, the laser will condition the enamel for better bonding and eliminate the need for use of an etching gel, improving patient management in pediatric patients by eliminating tasting of the etching gel and rinsing prior to sealant placement not being required. Additionally, bacteria within the pits and fissures are eliminated, decreasing the potential for recurrent decay under the sealant that will be placed. When caries are noted, a more conservative access can be utilized with the Lite Touch then is normally performed with a traditional bur (Figures 3 and 4). In clinical situations where soft tissue has either grown into the cavity or needs to be excised to expose the decay, the Er:YAG is able to remove that tissue without leaving a bleeding margin that can interfere with placement of an adhesive restoration (Figures 5 and 6).

The Lite Touch Er:YAG laser also will remove old composite as effectively as tooth structure. But when a failing amalgam is present, it is recommended in those clinical situations to use a handpiece and bur to remove the old restoration. The laser can then be used to clean the preparation surface, sterilizing the dentin and conditioning both the enamel and dentin for the adhesive restoration that will be placed. Dentin hypersensitivity is a common symptom, causing discomfort and in some cases severe pain in those patients with recession and root exposure. A 2-minute application with the Er:YAG laser applied to exposed cervical root areas has been found to provide lasting desensitization of the hypersensitive dentin, with no detrimental pulpal effects.

For more information, contact **AMD LASERS** toll-free at **(866) 999-2635** or visit ***amdlasers.com***.

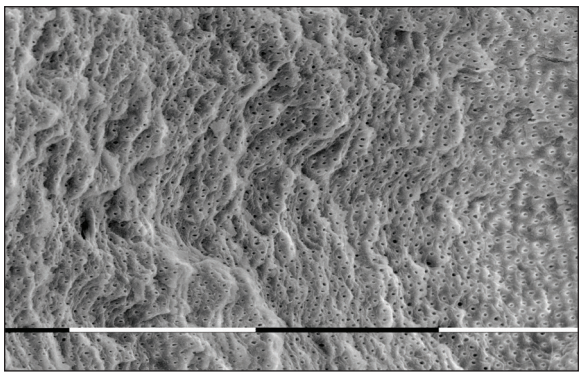

Figure 1: Dentin surface following caries removal with the Lite Touch Er:YAG laser demonstrating a lack of smear layer. *(Courtesy of Prof. Georgi Tomov, Plovdiv University, Bulgaria.)*

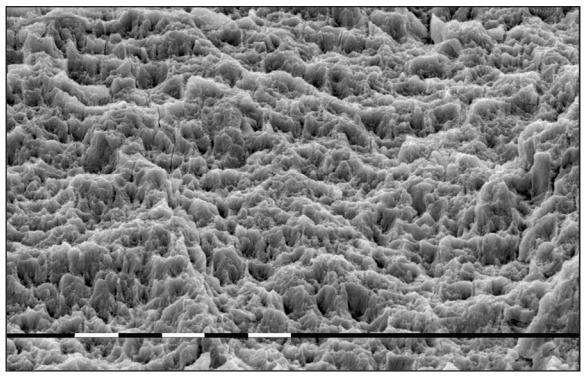

Figure 2: Enamel surface following treatment with the Lite Touch Er:YAG laser showing an enhanced bondable surface with a uniform roughen surface. *(Courtesy of Prof. Georgi Tomov, Plovdiv University, Bulgaria.)*

Figure 3: Caries noted in the distal pit of a first molar. *(Courtesy of Makoto Kamiya, DDS, Matsumoto City, Japan.)*

Figure 4: Preparation following caries removal with the Lite Touch Er:YAG hard-tissue laser demonstrating a minimally invasive preparation performed without the need for local anesthetic, ready for restoration placement. *(Courtesy of Makoto Kamiya, DDS, Matsumoto City, Japan.)*

Figure 5: Significant caries noted on the mesial of a deciduous molar with soft-tissue ingrowth into the area. *(Courtesy of Makoto Kamiya, DDS, Matsumoto City, Japan.)*

Figure 6: Caries and soft-tissue removal with the Lite Touch Er:YAG laser without application of local anesthetic, ready for restoration placement. Note an absence of bleeding at the altered soft-tissue margin. *(Courtesy of Makoto Kamiya, DDS, Matsumoto City, Japan.)*