Advantages and Limitations of Lasers

One of the main benefits for using dental lasers is the ability to precisely interact and, in some cases, remove almost a few cell layers at a time. Erbium lasers can have some selectivity in removing diseased tooth structure, since carious lesions have much higher water content than healthy tissue. Studies have shown other advantages over conventional high speed handpiece interaction on the tooth surface, such as the elimination of micro-fractures and a reported lowering of pulpal temperature as the preparation proceeds. Osseous tissue removal and contouring can also proceed easily with reported faster healing. Moreover, it has been demonstrated that the lased enamel has a good potential for bonded restorations as long as they are subsequently etched with acid.

Lasers also allow the clinician to reduce the amount of bacteria and other pathogens in the surgical field and in the cavity preparation; and, in the case of soft tissue procedures, achieve very good hemostasis with the reduced need for sutures and surgical packing. Several manuscripts point out that post operative scar formation is minimized; since the laser incision is more broad and irregular than that of a scalpel, the healing tissue better blends with the surrounding structures. Periodontally diseased tissue can be disinfected and detoxified. Lasers can successfully and safely be used on a wide range of the population such as children and pregnant women unlike some prescribed and/or sulcularly delivered drugs. Unlike those medications, the patient will not experience allergic reactions, bacterial resistance, or untoward side effects when the laser is used.

With good control of bleeding, there is greatly improved visualization of the surgical field, and many laser procedures can be performed with less injectable anesthesia. In those situations, additional treatment might be
able to be performed on the same appointment. Furthermore, initial postoperative discomfort and swelling are reduced because of the sealing of nerves and lymphatics.

There are some disadvantages to the current instruments. Presently available dental lasers only emit energy from the tip of the delivery system; and, in that sense, they are all “end cutting,” which usually means a modification of the practitioner’s clinical technique. Although they are useful for caries removal and tooth preparation, the Erbium family of lasers is unable to remove gold and vitreous porcelain, and has only a small interaction with amalgam. Of course, that fact is also an advantage when treating a recurrent carious lesion adjacent to a veneer or crown, for example, since there will be no interaction with the restorative material. However, most composite restorations can be ablated.

In some cases, the delivery system can be more cumbersome than an air rotor or electric handpiece, and accessibility to the treatment area could be limited. The clinician must carefully observe and monitor the rate of tissue removal to prevent overheating and lateral thermal damage. For enamel removal, the laser is not as fast as a rotary burr, although it can be more conservative by not removing as much healthy tooth structure.

The initial investment for some devices must be considered, as well as required supplies and maintenance. The instruments range in size from a paperback novel to a large dental cart, so logistics of space can become a factor. All units operate at line voltage and the Erbium lasers require an additional air supply.

Training and continuing education are essential, and most manufacturers provide good support. The Academy of Laser Dentistry offers a Standard Proficiency Course that educates the practitioner at a reasonable beginning competency. Several journals and a few textbooks are readily available for descriptions of clinical procedures and research.