Diode lasers for periodontal treatment: the story thus far

By Fay Goldstep, DMD

The concept of using dental lasers for the treatment of periodontal disease elicits very strong reactions from both ends of the spectrum. Everyone has an opinion. Everyone is certain that his or her own opinion is correct, but the only certainty is confusion and the lack of clear direction in the concept of laser assisted periodontal therapy (LAPT).

Much of this uncertainty stems from not comparing “apples to apples” in terms of the type of lasers utilized and the way that studies are designed. Certain lasers are used specifically for soft-tissue treatment. These include the CO2, Nd:YAG and diode lasers. Others can be used for both soft- and hard-tissue applications. These are the Er:YAG, Er and Cr:YSGG lasers. They must be compared within their own category.

Many of these lasers have been shown to provide periodontal treatment benefits. In order to achieve an element of clarity and simplicity on this very complex topic, the following discussion exclusively addresses the use of the diode laser for periodontal treatment.

A specific instrument

The diode laser has become an important tool in the dental armamentarium due to its exceptional ease of use and affordability. It also has key advantages with regard to periodontal treatment. The diode laser is well absorbed by melanin, haemoglobin and other chromophores that are present in periodontal disease.

Thus, the diode specifically targets unhealthy gingival tissues. The laser energy is transmitted through a thin fiber that can easily penetrate into deep periodontal pockets to deliver its therapeutic effects.

The 2002 American Academy of Periodontology statement regarding gingival curettage proposes that “gingival curettage, by whatever method performed, should be considered as a procedure that has no additional benefit to SRP alone in the treatment of chronic periodontitis.”

Also stated is that all the methods devised for curettage “have the same goal, which is the complete removal of the epithelium” and “none of these alternative methods has a clinical or microbiological advantage over the mechanical instrumentation with a curette.”

This was the science in 2002. More recent studies have shown that instrumentation of the soft periodontal tissues with a diode laser leads to complete epithelial removal while instrumentation with conventional curettes leaves significant epithelial remnants.

An effective instrument: bactericidal

Periodontal disease is a chronic inflammatory disease caused by a bacterial infection. Hence, the bactericidal and detoxifying effect of laser treatment is advantageous in periodontal therapy. The diode laser’s bactericidal effectiveness has been well-documented.

Moreover, there is a significant suppression of A. Actinomyetemcomitans, an invasive bacterium that is associated with aggressive forms of periodontal disease that are not readily treated with conventional scaling and root planing (SRP).

A. Actinomyetemcomitans is not only present on the diseased root surface, but it also invades the adjacent soft tissues, making it difficult to remove by mechanical periodontal instrumentation alone. This necessitates the use of adjunctive antibiotic therapy.

The diode laser provides a non-antibiotic solution. A. Actinomyetemcomitans has also been found in atherosclerotic plaques and there has been evidence to suggest that subgingival A. Actinomyetemcomitans may be related to coronary heart disease. This makes it even more compelling to seek methods to control this aggressive pathogen.

Wound healing

Diode lasers are very effective for soft-tissue applications including incision, hemostasis and coagulation. Many advantages of the laser vs. the scalpel blade have been discussed in the literature. These include a bloodless operating field, minimal swelling and scarring, and much less or no postsurgical pain.

When laser surgical procedures are carried out, the surface produced heals favorably as an open wound without the need for sutures or surgical dressings. Studies have shown enhanced, faster and more comfortable wound healing when the diode laser is used in conjunction with SRP.

An adjunct to scaling and root planing

There is very compelling evidence in the dental literature that
the addition of diode laser treatment to SRP (the gold standard in non-surgical periodontal treatment) will produce significantly improved results. After SRP, the diode laser is used on the soft-tissue side of the periodontal pocket to remove the inflamed soft tissue and reduce the pathogens.

Research has demonstrated better removal of the pocket epithelium compared with conventional techniques. Many studies have shown increased reduction of bacteria (especially specific periopathogens) when diode lasers are utilized after SRP.

Significant improvement in decontamination and effective treatment of peri-implantitis also occurs with the addition of diode laser therapy. Gingival health parameters are significantly improved with the addition of the diode laser to SRP. Studies have shown decreased gingival bleeding, decreased inflammation and pocket depth, as well as decreased tooth mobility and decreased clinical attachment loss.

This improvement in gingival health remains more stable than with conventional SRP treatment alone and tends to last longer. Moreover, patient comfort is significantly enhanced during the postoperative healing phase with the addition of diode laser therapy.

The research thus shows diode laser periodontal treatment to be an effective procedure. It is also a minimally invasive procedure. Patients are demanding less surgery and the diode laser provides the general dentist with an excellent means of keeping periodontal treatment in the general practice.

A safe instrument
Histological testing of roots where the diode laser was used after SRP demonstrated no detectable surface alteration to root or cementum. There were no signs of thermal side effects in any of the teeth treated.

Many studies have specifically indicated no adverse tissue events, demonstrating the safety of the diode laser.

The diode laser’s very effective bactericidal action on periodontal pathogens makes the adjunctive use of antibiotics unnecessary. This eliminates the problem of bacterial resistance and systemic side effects engendered by antibiotic use. The laser is a safer, more effective treatment.

The protocol thus far
The research cited above has demonstrated that the use of the diode laser after conventional SRP is superior to SRP alone. Various protocols have been developed by clinicians to incorporate this treatment into the busy dental practice. These protocols may be performed by the dentist and/or the hygienist as determined by the regulating organization in the geographic location of the dental practice.

Individual parameters vary depending on the clinician and the particular diode laser that is being used. However, most protocols do follow a simple formula.

The hard side of the pocket (tooth and root surface) is first debrided with ultrasonic scalers and hand instrumentation (Fig. 1).

This is followed by laser bacterial reduction and coagulation of the soft tissue (epithelial) side of the pocket (Figs. 2, 3).

The laser fiber is measured to a distance of one millimeter short of the pocket depth. The fiber is used in light contact with a sweeping action that covers the entire epithelial lining, from the base of the pocket upward. The fiber tip is cleaned often with a damp gauze to prevent the buildup of debris.

Re-probing of treated sites should not be attempted for three months postoperatively (Fig. 4) because healing starts at the base of the pocket and the new tissue remains fragile for this period of time.

The power settings and time parameters are determined by the particular laser used. The diode laser clinician must take training on the specific laser that will be used in the practice to be fully able to implement laser assisted periodontal therapy.

With experience, the user will feel comfortable enough to adapt the protocol to his or her particular practice.

In the future, protocols will be modified and fine-tuned by various laser user groups after discussion of their experiences and results.

These results will be incorporated into new procedures that will bring laser-assisted periodontal therapy to a newer, more effective level.

The time has come
The time has come to embrace the routine use of lasers for the treatment of periodontal disease. The diode laser has been shown to be effective and safe for this purpose. If not now, when?
San Francisco meeting offers three days of education and new technology

CDA introduces new Thursday–Saturday schedule for courses and exhibits

By Fred Michmershuizen, Online Editor

The California Dental Association's San Francisco meeting, CDA Presents: The Art and Science of Dentistry, will be held Sept. 9–11. In response to attendee and exhibitor feedback, the CDA is instituting a new Thursday through Saturday schedule, featuring three full days of courses and exhibits showcasing innovative products and services.

The new Thursday through Sat-urdays show pattern will also apply to future CDA meetings, including those held in Aruba.

Thousands of dental professionals are expected to convene to take advantage of C.E. opportunities, dynamic speaking engagements, an impressive exhibit hall and plenty of networking. According to the CDA, the 2009 San Francisco meeting attracted 16,125 attendees, of which 4,625 were dentists.

Continuing education

CDA Presents offers an opportunity for attendees to fulfill continuing education requirements at a fast pace. The meeting’s workshops, free lectures and other C.E. opportunities are a convenient way for dental professionals to meet license renew- al requirements.

The Dental Board of California recently adopted new continuing educa- tion regulations. The regulations no longer specify courses as Category I and Category II. The regulations, however, are speci- fic regarding the content type and limit the number of credits for specific content areas.

To facilitate California licensed dental professionals in complying with the new regulations, CDA will identify each course’s content as either a “Core” or a “20%” course. This is very similar to the previ- ous Category I and II and divides continuing education courses into two categories that are defined as follows:

- Core courses must make up a minimum of 80 percent of the credits in a renewal cycle. These courses include courses that directly enhance the licensee's knowledge, skill and competence in the provision of service to patients or the community.
- 20% courses can make up only 20 percent of the credits in a renewal cycle. These courses include courses considered to be primarily of benefit to the licensee.

For every renewal cycle, California state law requires licensed dentists and allied dental health profession- als to complete two units in infection control and two units in the California Dental Practice Act. Licensees are also required to complete a course in basic life support.

Educational highlights

The following topics and speakers are among the highlights of CDA’s San Francisco meeting (see program guide for exact times and locations):

General dentistry: Victoria L. Wal- lace, CDA, LDA  • “Team FABULOUS!” a Thursday workshop.
  • “Totally Bonding! Simple and Easy Tips for a Great Adhesive Restora- tion,” a Friday morning lecture.
  • “Tooth Whitening at Its Best? Abso- lutely!” a Friday afternoon lecture.
  • “White Done Right With Custom Fit Trays ... Let’s Make Some Whitening Trays Workshop,” a Saturday workshop.

Esthetic dentistry: Brian P. LeSage, DDS, FAIAD, and Edward A. McLauren, DDS  • “Esthetic Continuum Workshop,” a two-day workshop on Thursday and Friday.


Oral Pathology: John A. Szirnisky, DDS, Med  • “Cases Only a Mother Could Love,” a Thursday and Saturday morning lecture.
  • “Drugs I Have Known and Loved for: Diseases That We Catch,” a Thursday afternoon lecture.
  • “Great Cases With New Faces,” a Saturday afternoon lecture.

Pediatric Dentistry: Jane A. Saxonman, DDS  • “Managing the Developing Dental Cariogenic Risk,” a Friday morning lecture.
  • “Clinical Techniques in Pedodontics,” a Friday and Saturday afternoon lec- ture.
  • “Reinventing the Pediatric Alpha Pop,” a Saturday morning lecture.

Periodontics: Robert C. Fazio, DMD  • “Antibiotics in Dentistry,” a Thurs- day morning lecture.
  • “Medicine and Dentistry,” a Thurs- day afternoon lecture.
  • “Periodontitis and Peri-implantitis: The Good, the Bad and the Ugly,” a Friday lecture.

Pharmacology: Harold L. Crossley, DDS, PhD  • “Street Drugs Exposed: What Your Patients and Your Kids Are Not Tell- ing You,” a Friday lecture.
  • “Avoid Liability: Know Your Patients’ Medications and Their Impact on Dental Treatment,” a Saturday lec- ture.

  • “Conversations With Patients That Work,” a Saturday morning lecture.
  • “Growth Strategies: Marketing, Acquisitions and Transitions,” a Sat- urday afternoon lecture.

Restorative Dentistry: Mark A. Laia, DMD, MS  • “Essentials for Creating Stratified Anterior and Posterior Direct Com- posites,” a Friday lecture.
  • “Direct Anterior Composite Veneers/ Posterior Resin Restoratives,” a Sat- urday workshop.

Exhibit hall

If you’re looking for the latest tech- nology, products and services in den- tistry, you need look no further than a CDA Presents. In all, the meeting will feature approximately 400 companies occupying 85,000 square feet of exhibit space on Thursday, Friday and Saturday.

The exhibit hall hours are as fol- lows:

- Thursday from 10 a.m. to 6 p.m.
- Friday from 9:30 a.m. to 5:30 p.m.
- Saturday from 9:30 a.m. to 4 p.m.
- Exhibit hall happy hour is Thursday from 4:30 to 6 p.m.

Family hours are daily from the opening of exhibit hall until noon.

Child care is available at the Mar-riott Marquis Thursday and Saturday from 7 a.m. to 6 p.m.

The Spot

Again this year, CDA Presents will feature The Spot — a lounge for learning, networking and more. This interactive area is located in the exhibit hall.

Attendees can earn C.E. credit, see new products, plan an office renova- tion, check e-mail and even enjoy a cup of coffee while relaxing with friends.

The Spot will be open Thursday, Friday and Saturday during exhibit hall hours.

SF MOMA visit

On Friday evening, CDA members and their guests will enjoy exclusive entrance into SF MOMA from 7 to 10 p.m.

The evening will consist of a buff- et that will serve as either a prelude for a dinner in San Francisco or a light dinner for those who wish to...