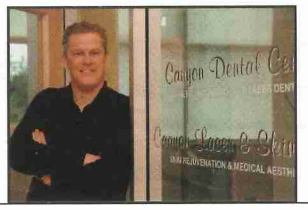
# Laser Dentistry




## The Diode Laser in Dental Hygiene—Part 2 (LAPT)

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### Introduction

In last months edition of Dentistry Today, I discussed the role of the diode laser in bacterial reduction as part of a regular dental hygiene visit.. In most states in the U.S.A. and as well in most provinces in Canada, the diode laser can be used as an adjunct to traditional dental hygiene procedures to help with the reduction of bacteremias, to help prevent cross-contamination of periodontal pockets through probing or scaling and to help reduce the risk of periodontal abscesses after hygiene visits for patients. As mentioned, the laser should not be considered as the "Harry Potter Magic Wand" , which placed in the sulcus leads to a magical reduction of double digit pockets depths to 3 mm depths, as this is simply not the case. The clinician should expect any improvements in pocket depth to be from the top of the periodontal pocket down ( recession of pseudopockets), but there is often clinical improvement in tissue appearance, less bleeding on probing and less inflammation in the gingival tissues.

In those jurisdictions where the laser can be used for LBR ( Laser Bacterial Reduction) the typical settings are 1.5 w pulsed, and the laser tip is not initiated. The lack of initiating the tip allows the laser energy to be used to help with bacterial reduction while not interacting with tissue. The laser energy in LBR is used to reduce bacteria in the pockets through cell lysis of cell membranes, without significant ablation of tissue, and in fact the laser tip should be periodically examined by the clinician or hygienist to make sure that accidental initiation of the tip on sulcular fluids does not occur. Once the tip is initiated, the clinician will then begin to have the laser energy ablate the inner wall of epithelial tissue in the pocket and this is then considered to be gingival or laser curettage and in many areas is not part of the legislated actions that a hygienist can use the laser for. It is therefore imperative to discover whether LBR ( uninitiated tip) or LAPT ( initiated tip) can be completed by the dental hygienist in your locale. See Table 1..

**Table 1**
**LBR Procedural Guide**

| Step | Procedure |
|---|---|
| 1 | Put safety glasses on Patient, assistant, doctor and anyone else in operatory. |
| 2 | Remove Picasso Lite 90 degree 5 mm or 10 mm tip from the package and attach to the fiberoptic multi tip handpiece. |
| 3 | Do NOT initiate the tip to allow laser energy to pass beyond the tip into the sulcus. |
| 4 | Use comfort mode setting ( blue happy face) on Picasso Lite and set laser at **1.5 w PULSED.** (30 micro second duration and interval) |
| 5 | Place tip 0.5 - 1 mm into the most distal sulcus on the upper right FACIAL surface, and in a sweeping horizontal motion taking **3-4 seconds** pass from the distal interproximal to the mesial papilla on that tooth. |
| 6 | Withdraw the fiber tip and inspect it to make sure no coagulum or debris is accidentally attached. If so remove with a wet gauze with either water, or hydrogen peroxide. If the tip initiates ( Darkens) either recleave or replace the tip. |
| 7 | Complete all FACIAL pockets and continue in the same manner on the LINGUAL periodontal pockets of the maxillary teeth. |
| 8 | Repeat process for the mandibular teeth starting on the facial of the most distal tooth in the lower left and proceeding towards the most distal tooth on the opposite side. Finally complete all lingual pockets of the mandibular teeth. |

### Laser Assisted Periodontal Therapy ( LAPT)

The treatment of periodontal disease has as one of its cornerstones - diagnosis. This includes complete probing and charting of recession, clinical attachment levels, and a visual inspection of sites of bleeding ( inflammation). In addition to periodontal charting, the dental team should identify and discuss host risk factors associated with periodontal disease including a history of diabetes, tobacco use, elevated stress, history of cardiovascular disease or osteoporosis. It is only with a thorough diagnosis that in office treatment can be undertaken in an attempt to improve the periodontal condition of the patient.

In office treatment of the patient's periodontal condition can be attempted once a complete diagnosis is done. In the authors experience, the dental team should start with traditional methodologies of ultrasonic and hand scaling and root planing in combination with antimicrobial agents and comprehensive home care instructions. These traditional methods are augmented with Laser Bacterial Reduction. Post operative evaluation intervals typically varies in length from 3-6 months after the initial in office visit. At this re-evaluation appointment, if there are persistent areas of inflammation seen as bleeding on probing which signify active inflammation then Laser Assisted Periodontal Therapy (LAPT) can be undertaken.

There is considerable debate over the use of a laser to perform curettage. The official statement of the AAP from 2002 is that ***"These findings indicate that despite advances in technology, gingival curettage, as a clinical procedure, fails to consistently provide any advantage over Scaling and Root Planing alone for the treatment of chronic periodontitis."*** This finding follows the 1989 World Workshop in Clinical Periodontics which concluded that mechanical curettage with scalers " no justifiable application during active therapy for chronic adult periodontitis". (1-2)

On the other hand there is research to show that lasers offer advantages over traditional methodologies of gingival curettage. Romanos et al (3) found that "The histological findings presented in this study showed that instrumentation of the soft periodontal tissues with a diode laser (980 nm) leads to a complete epithelial removal in comparison to conventional treatment methods with hand instruments." In addition, Lin et al in a recent study (4) found that the laser offered significantly less discomfort than the control group and resulted in statistically significant improvements in probing depth, sulcus bleeding index, gingival index, and clinical attachment levels.

### Clinical Protocol for LAPT.

LAPT is best done at the end of the dental hygiene appointment and is often completed by the dentist as laser curettage is in many states not able to be delegated to the hygiene team. The 90 degree single use tip of either 5 or 10 mm in length is removed from its package and snapped onto the Picasso Lite Fiber Optic Multi Tip Handpiece. The tip is initiated thoroughly on either articulating ribbon or cork so that the tip is now acting as a "hot tip". The clinician should measure the pocket depth and stay one mm short of the base of the pocket when lasing. A setting of 0.3-0.8 watts Continuous Wave is chosen. Lower settings are used on early signs of periodontitis exist ( 3-4 mm) and higher settings are used for more moderate cases (4-6mm). The time per site is from 20-40 seconds depending on the severity of the pocketing. The tip of the laser is angled towards the gingival epithelium on the inner wall of the sulcus and in a back and forwards motion the laser tip is carried horizontally and vertically from sulcus crest to 1mm short of the base of the pocket until a fresh bleed is observed emanating from the pocket. The tip should be inspected after being removed from each sulcus to make sure that any accumulation of tissue that may occur on the tip is removed before the tip can become self initiated. If the tip does become initiated try removing the debris with a wet gauze with water or hydrogen peroxide. Avoid using alcohol on the gauze as this may accidentally ignite when the foot pedal is activated. (See Table 2).

LAPT essentially removes the epithelium from the inner wall of the periodontal pocket and reduces bacteria in the pocket. It must be remembered that once the laser is used, that the pocket will grow back with epithelium migrating at a rate of 0.5 mm a day whereas bone is only able to grow at around 0.04 mm per day. Therefore, it is very difficult to reduce a pocket with the laser from the bottom up using LAPT unless the patient is reappointed every 10-14 days and the laser again is used for LAPT but with the tip extending to a depth that is 1mm less than the previous appointment. This of course can be a scheduling nightmare for the patient and dental team and in addition can prove to be an expensive option as well. With this concept in mind, some offices will simply use LAPT in a one time attempt to help reduce inflammation with little concern for a reduction of probing depths. It has been the authors experience that the laser should be part of a comprehensive hygiene protocol ( like that supported by Oral Sciences in Canada- www.oralscience.ca) where the laser is used in conjunction with thorough scaling/ root planing, use of chemotherapeutic agents ( CHX, SnF2 rinses), localized antibiotics (Atridox) and systemic ( Periostat) anti inflammatory medications. To expect complete pocket resolution through the singular use of the laser is unrealistic and will prove to be disappointing in this authors experience.

**Table 2.**

| Step | Procedure |
|---|---|
| 1 | Place safety glasses on patient, assistant, doctor and anyone else in operatory. |
| 2 | Remove Picasso Lite 90 Degree 5 or 10mm tip from the package and attach to the fiberoptic multi-tip handpiece. |
| 3 | Initiate the tip thoroughly with articulating ribbon or with a cork. |
| 4 | Use settings of 0.3-0.4 w CW for early perio cases for 20 seconds. |
| 5 | Use settings of 0.5-0.6 w CW for early to moderate perio cases for 30 seconds. Local anesthetic may be needed for these cases. |
| 6 | Use settings of 0.7-0.8w CW for moderate perio cases for 30-40 seconds. Local anesthetic often is needed for these cases. |
| 7 | Angle tip towards the inner wall of the pocket and use a horizontal and vertical motion keeping in contact with soft tissue until the measured pocket depth minus 1mm is reached. |
| 8 | Inspect the distal end of the fiber frequently to ensure that no tissue or debris is accumulating on the tip. Wipe off with gauze with water or Hydrogen Peroxide. |
| 9 | Treatment per site is completed when signs of a fresh bleed are seen but for no longer than 45 seconds per site. |
| 10 | Post operative instructions include analgesics ( Ibuprofen) if needed, brushing with a soft tooth brush, flossing, and avoidance of spicy foods. |
| 11 | Mouthrinses or irrigation with Water Pik devices should be lightly used in the first 2-3days. |

**Laser Assisted Bacterial Reduction (LAPT) protocol.**
**(All photos courtesy of Dr. Don Coluzzi)**

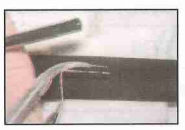

Fig. 1. Measure pocket depth and calibrate tip to 1mm short of complete pocket depth

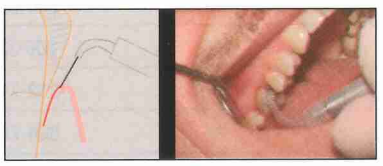

Fig. 2. Diode laser tip is initiated and angled towards the inner walll of the sulcus.

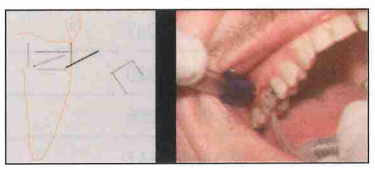

Fig. 3. Using back and forth, vertical and horizontal movements until the bottom of the sulcus is reached.

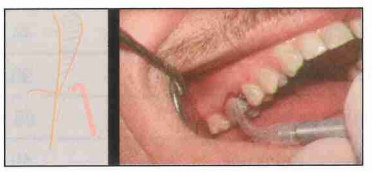

Fig 4. Lasing is complete whten a fresh bleed emanates from the sulcus and the bottom of the pocket is reached.

**References**
1. AAP Academy Report - The American Academy of Periodontology Statement Regarding Gingival Curettage. J. Periodotol, October 2002, 1229-30.
2. Kalkwarf K. Tissue attachment. In: Proceedings of the World Workshop in Clinical Periodontics. Chicago: American Academy of Periodontology; 1989:V1-V19.
3. Romanos GE, Henze M, Banihashemi S, Parsanejad HR, Winckler J, Nentwig GH Removal of epithelium in periodontal pockets following diode (980 nm) laser applicatio in the animal model: an in vitro study. Photomed Laser Surg. 2004 Jun;22(3):177-83.
4. Lin J, Bi L, Wang L, Song Y, Ma W, Jensen S, Cao D. Gingival curettage study comparing a laser treatment to hand instruments. Lasers Med Sci. 2011 Jan: 26 (1): 7-11.