

Laser Dentistry



The Diode Laser — Tip Selection and Initiation of the Tip

By Dr. Glenn van As

Introduction

In last month's edition of Dentistry Today, I discussed the role of the diode laser for bacterial reduction in laser assisted periodontal therapy. As I mentioned, the diode should be used with caution, with minimal expectations of pocket reduction. The goal should be to use the diode to help with reducing inflammation in the sulcular tissue. Any reduction in pocket depth is typically from the top of the pocket down (recession in pseudo pockets), and the usage of diodes should not be considered to routinely produce periodontal pocket reduction through bone regeneration from the bottom of the pocket upwards. The simple fact is, that even with laser curettage, when de-epithelialization of the pocket does occur, epithelial tissue grows much faster when compared to bone, and thus will quickly fill up the pocket. Therefore, any reattachment will likely be of the weaker long junctional epithelium nature and not the more desirable cementum mediated reattachment.

In this article I will focus on a simple, but for many new users a confusing procedure that must be completed prior to starting many diode laser procedures. The process of the **selection** of the ideal disposable tip and when and how to best **initiate** that tip. The Picasso Lite diode comes standard with a multi tip handpiece which is a fiberoptic bundle that carries the laser energy from the back of the laser to the surgical site. Many diodes have a strippable fiber that each time after you use it, you must remove the insulation (strip the fiber), as well as cut it clean and sharp (cleave the fiber). This strippable fiber is economical, and available in 200 micron (endo) and 400 micron (surgical diode dentistry) sizes for all Picasso lasers. However, many clinicians prefer the simplicity and ease of single use tips, where the tip is simply removed from the package having already been stripped and cleaved and is ready to go.








Selection of the Disposable Tip.

The Picasso Lite laser has many tips available for it (table 1) and they all can fit on the multi- tip handpiece. These tips come in boxes of 25, as either one shape and length or as an assortment of the shapes and lengths. These tips come in 3 shapes (**straight, 45 degree and 90 degree angles**) and two lengths (**5 and 10 mm**). Choice of which tip to use is somewhat of a personal preference, but I have provided for readers an overall guide to when I use certain tips. Of course, individually the user may find that one tip or another works better in their hands. My primary tip of choice particularly for crown troughing, gingivectomies and laser bacterial reduction is a 90 degree tip that is 10 mm in length. The reason for this is that the 90 degree angle allows for ease of use in the posterior of the mouth and the 10 mm tip allows for ablation even in the most difficult to access areas (i.e. crown troughing on posterior teeth that have long clinical crowns). These 10 mm tips are long and quite flexible so much so that some clinicians prefer the shorter and firmer 5 mm tips instead, but access in certain situations may be more limited. One additional consideration on tip selection is that should the tip become chipped, or fractured during use, and it is 10 mm long, it can often be re-cleaved shorter and reused on the same patient without the clinician having to use a second tip for the same procedure. I am often able to use a single tip for crown troughing on up to 12 teeth in one arch during a rehabilitation case, so with care and a gentle movement, these tips are very durable.

It is very important to make sure that no gaps exist in the connection of the disposable tip to the Multi tip handpiece. The connection between the disposable tip and the metal portion of the handpiece must be firm, and the canula and the tip must be firmly connected together. Should the tip come loose from the canula, simply connect the two pieces together again, as it is not broken at all and will work fine once reconnected.

There are two additional tips that can be connected to the multi-tip handpiece and they include the Bleaching handpiece which is not single use and the Low Level Laser Therapy tip which is. The Bleaching Handpiece should only be used with the 7 watt Picasso when providing laser bleaching to patients. The Picasso Lite (2.5w) laser cannot provide enough energy to the tip to be effective for laser bleaching. The Low Level Laser Therapy tip has a 8 mm lens on the straight canula that can be used for biostimulation to improve wound healing for large oral lesions, TMJ therapy, postoperative pain and delayed wound healing from extractions etc. It is a non ablating tip and as mentioned is disposable. More information on tip selection can be found in table 1.

Table 1 - Tip Selection for Picasso Lasers.

Tip	Length	Procedures	
Straight	10mm	Anterior gingivectomy, frenectomy, oral lesions.	
45 degree	5mm	Gingivectomy, Crown Troughing, Fibroma removal.	
45 degree	10mm	LBR, LAPT, Posterior crown troughing and gingivectomy.	
90 degree	5mm	Gingivectomy and Crown Troughing on short teeth, Implant uncover, Operculectomy.	
90 degree	10mm	LBR, LAPT, Posterior crown troughing and gingivectomy, Implant uncover.	
LLLT Tip	Straight 8mm lens	Biostimulation, wound healing, pain reduction, tx. of large oral lesions.	
Bleaching Handpiece	Must be used with 7 w Picasso Laser.	Laser Bleaching, can be used for LLLT for large areas.	

Initiating the Disposable Tip.

Now after selecting the tip that you wish to use, one must consider whether to **INITIATE** the tip or not. **The simple rule is that any time that you wish to be in contact with tissue and ablate it, the tip must be initiated.** The process of initiating the tip will concentrate the laser energy in the tip essentially making it a "hot tip". The monochromatic laser light is turned into heat and hence this process is called a **photothermal** reaction. The heat that is generated causes a localized zone of vaporization, surrounded by zones of carbonization (try to keep the char zone as small as possible), coagulation and hyperthermia. Fig. 1 The higher the settings, typically the faster the vaporization, but the greater these other zones of unwanted lateral thermal damage may be. In keeping with the Academy of Laser Dentistry's most current guidelines which "advise the use of the lowest average fluence to avoid risks of excessive heat complications whenever possible." (1) Of course total treatment time must also be kept in mind in trying to minimize the collateral thermal damage that can be created by prolonged exposure to laser energy through settings that are not above the ablation threshold required for vaporization.

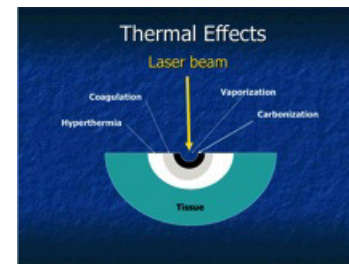


Figure 1. Thermal Effects of Diode Laser Ablation.

The process of ablation or vaporization requires the tip of the diode laser to be initiated. There have been several methods proposed over time from initiating the tip on the tissue itself, initiating with a sterile black sharpie marker, using a cork to initiate the tip, using black ebony ar paint on the tip and finally the most common methodology of using a piece of articulating ribbon to initiate the tip.

In recent research (2) soon to be published this year in the Journal of Laser Dentistry, Dr. Wayne Selting who was the ALD 2011 recipient of the TH Maiman Award presented annually for excellence in dental laser research provided some excellent new information on the process of initiation. Dr. Selting showed that using cork for initiation as I have repeatedly suggested was in fact perhaps not the best idea. The initiation of the tip in cork is not as effective as using articulating ribbon. The tip is only partially covered with loose ash and it can wipe off immediately. If you must reinitiate the tip, after ablation attempts are unsuccessful on tissue in the mouth, then the cork is no longer sterile when you reinitiate the tip. Approximately 11% of the tip is initiated using the cork whereas with ideal initiation of the tip with articulating ribbon almost 60-80% of the tip can be initiated. The process of initiation traps almost all of the energy in a very small zone (likely 20-40 micron layer) and the tip can heat up to 1500 Celsius in just a couple of seconds. Care must be taken with these temperatures to not "melt" the tip, so lower energies will yield better ablation of the tissue if proper initiation of tip is accomplished. Starting with a setting of 0.8-1.0 continuous wave after initiation of the tip is a nice starting point for many procedures to minimize the collateral thermal damage that can occur. (Figure 3). Below in Table 2 is the ideal initiation sequence according to Dr. Selting for the Picasso Lite lasers.

Table 2 - Dr Wayne Selting Initiation Technique.

Step	Procedures
1	Select appropriate single use disposable tip (straight, 45 or 90 degree)
2	Select single piece of blue articulating ribbon (Bausch is a good brand- See Figure 2)
3	Set the laser at a low setting of 0.3-0.5 watts.
4	Touch the tip to the articulating paper first then step on foot pedal for ONE second.
5	Repeat 8 times or more.
6	Touch initiated tip to tissue holding tip stationary and look for signs of ablation (laser plume, and vaporization of tissue).
7	Begin procedure or reinitiate tip if needed on the articulating paper.



Figure 2. Bausch Articulating Ribbon.

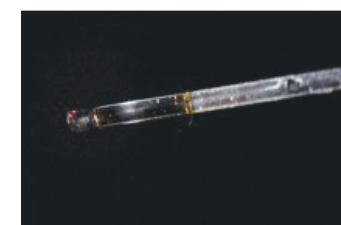


Figure 3. Properly Initiated tip.

With careful selection of the desired tip, and initiation of the tip when using the diode laser in contact to ablate tissue, the ablation of tissue can become much more predictable and completed with lower settings, providing for less post operative discomfort for the patient, and lower risks of developing iatrogenic sequelae as well.

References

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