

Laser Dentistry

Posterior Crown Troughing with the AMD Picasso Lite Diode Laser



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Introduction:

The recent and dramatic drop in the price of diode lasers has made this technology an attractive and increasingly popular alternative to traditional methods (cord and electrosurgery) for the management of soft tissue in fixed prosthodontic procedures. When crown troughing with the diode laser is compared to the traditional techniques, many clinicians find the laser to be easier, and quicker than "packing cord". Often, clinicians who are looking to replace their electrosurgery units discover that the laser can be used around adjacent restorations that are metal (amalgam and gold), or implants. In addition, when the laser is used at low to moderate settings, (0.6 -1.5 watts CW) they offer less risk of harm to dental hard tissues (bone) or soft tissues (pulp). Diode lasers can be used to trough around an endodontically treated tooth with minimal need for anesthetic, and these lasers have antibacterial capabilities as well. (1)

CEREC users routinely use the reliable, small, portable diode laser to enhance the gingival trough prior to powdering their preparation before the optical impression. The safety of using lasers for tissue retraction has been documented by Gherlone et al (2) who found lasers (diode and Nd:YAG) to yield less bleeding and less recession than either double cord or electrosurgery techniques. Their interesting conclusion was that the laser techniques were in fact "less traumatic to the periodontal tissues".

Technique:

A small learning curve exists, in knowing when and how to properly use the diode laser for tissue management. The author suggests that a new user begin with posterior teeth first, where esthetic requirements are not as demanding as with indirect anterior restorations. With practice, many clinicians will almost completely eliminate cord from their practice, particularly in the posterior segments. In critically esthetic areas where thin tissue genotypes exist, or if the patient is changing the color of the tooth significantly from the existing stump shade, then care with diode troughing must be taken.

In the author's experience, vital to the success of laser troughing are two important principles: **adequate magnification** for both the preparation of the tooth and the use of the laser (eg. 4.0X loupes), and the judicious use of **lower powers** on the diode laser (eg. 0.6 -1.1 watts of power in Continuous Wave).

The initial crown preparation is completed and the properly **stripped, cleaved and initiated** quartz fiber tip (or **single use initiated disposable tip**) is extended just into the gingival sulcus (0.5 - 1.0 mm). Circumferentially the laser is moved in small brush like strokes around the preparation, creating a slight distention of the tissue away laterally away from the margin of the preparation. This lateral distention is not intended to lower the height of the tissue like a gingivectomy would but simply create a "moat" which separates tooth from soft tissue. This separation allows for room for the impression material to capture details of the margin location.

The total time for the troughing circumferentially should be around 45-90 seconds and careful analysis of the laser/tissue interaction should reveal minimal to no charring of the soft tissue which can create postoperative discomfort and greater risk of gingival recession. If the laser is put in pulsed mode (comfort mode) the tissue has time to relax between pulses mitigating any iatrogenic effects of heat buildup.

After the initial laser trough has been completed, the clinician places the final margin on solid tooth structure or slightly subgingival on the facial for esthetics. Hydrogen Peroxide in a Dental Infusor (Ultradent) or a wet cotton pellet can be scrubbed on the soft tissue to remove any white tissue tags which may accidentally droop onto the margin. Increased lateral distention of the tissue trough can be accomplished with materials like Expasyl or Traxodent injected briefly into the sulcus. Vigorous rinsing of the sulcus after 90 - 120 seconds will yield a clean, dry and well delineated margin and the final impression can be taken. Provisional restorations should be evaluated to make sure that they do not extend into the sulcus which can iatrogenically cause the tissue to recede. Careful removal of temporary cement completes the initial appointment.

The patient returns for final insertion of the crown in 10-14 days and upon removal of the provisional crown, the tissue appears healthy, and situated exactly where the laser troughing placed it at the first appointment. In cases of poorly



fitting provisional crowns, some soft tissue "bounce back" leading to the margin being covered by soft tissue. The diode laser with topical (Cetycaine) and settings of 0.6 -0.8 watts (CW) can be used to remove any soft tissue overhanging the margins and the crown can be tried in and cemented. With careful attention to detail the results can be identical to those obtained with traditional methods (see case below) and the diode laser will become an indispensable part of the soft tissue management and impression taking for fixed prosthodontics.

Table 1 - Clinical Procedure for Laser crown troughing.

Step	Procedure
1	Initial gross reduction and margin placed equi-gingival with magnification.
2	Diode laser troughing: suggested settings 0.6-1.1 w CW (less in anterior)
3	Final margin placement subgingivally as needed for esthetics.
4	Hydrogen Peroxide or wet cotton pellet to remove tissue tags
5	Lateral distention of tissue if needed (Expasyl, Traxodent).
6	Rinse and take PVS impression
7	Provisional fabrication - Careful to make sure no overhangs.

Clinical Case 1 comparing diode laser troughing to retraction cord.



Fig.1 Diode laser being used to "laser trough" around first premolar at 0.8 watts. Fig.2 Occlusal view of tissue management with laser (first premolar) and cord (2nd premolar)



Fig. 3 High magnification view showing differences in impression of gingival sulcus with cord (left) and laser (right) but acceptable results with both methods. Fig. 4 Occlusal view of healed tissue after provisionals removed after 2 weeks.



Fig. 5 LAVA crowns in place on both teeth - occlusal view immediately postop. Fig. 6 LAVA crowns in place on both teeth - labial view immediately postop

References

- Christensen GJ. Soft-tissue cutting with laser versus electrosurgery. J Am Dent Assoc. 2008 Jul;139(7):981-4.
- Gherlone EF, Maiorana C, Grassi RF, Ciacaglini R, Cattoni F. The use of 980-nm Diode and 1064-nm Nd:YAG Laser for Gingival Retraction in Fixed Prosthodontics. J Oral Laser Applications. 2004; 4:183-190.