

The Diode Laser - The Diode Laser for Gingivectomies in Orthodontics -By Dr. Glenn A. van As



In last months edition of Dentistry Today, I discussed the value of the diode laser for its role in uncovering implants during second stage surgery . The Picasso Lite and Picasso 7w (World) diode lasers can be used to safely around implants and metal without fear of increased heat, sparking or arcing when in contact with metal. In contrast with electrosurgery units which can cause catastrophic results when used around metal in the mouth, lasers can be used to safely remove soft tissue in conjunction with metal. (1-2) In this edition, I will cover how a diode laser can be used to reduce gingival hyperplasia that results in orthodontics during space closure and with poor oral hygiene.

Introduction

The process of straightening teeth with orthodontic appliances has become commonplace over the last three decades. With the advent of bonding of brackets, and the publics value on a straight white smile, braces have become accepted by both adolescents and adults as a method of choice to improving their crooked smile. In a 2004 independent study conducted on behalf of the American Academy of Cosmetic Dentistry (3) it was discovered that:

1. 99.7% of Americans believe a smile is an important social asset.
2. 96% of adults believe an attractive smile makes a person more appealing to members of the opposite sex.
3. 74% of adults feel that an unattractive smile can hurt a person's chances for career success.

The acceptance of orthodontics as a necessary aspect of creating a beautiful straight smile has skyrocketed in the last 3 decades, and new technologies of ceramic brackets, tooth colored polymeric elastics and wires, combined with lingual brackets have meant that more and more people are accepting orthodontic treatment plans for themselves. Although orthodontics can improve a patients occlusion, speech, appearance, comfort and self esteem there are inherent risks and complications as well. These complications can affect the crowns (caries), roots (resorption), pulp (pulpitis), bone (resorption), TMJ (dysfunction), as well as the soft tissues. Orthodontic appliances can cause direct trauma to the lips and soft tissues, as well as ulceration, clefts and poor gingival contours (4).

Fixed orthodontic appliances make hygiene difficult for almost all patients and this results in some degree of gingival inflammation. (5) Inflammation affects the

interproximal areas more than the facial areas of teeth and although the inflammation can subside after removal of the brackets, this is not always the case. In some instances, the inflammation can result in such gross swelling of the soft tissues that placement of the archwires becomes difficult or impossible. Enlargement of the gingiva can promote more plaque accumulation, resulting in caries and profuse bleeding during eating, and any attempts at oral hygiene. Gingival inflammation is most commonly present during and after closure of diastemas (spaces) when C-Chain elastic thread is being used to close the spaces. The resulting “bunching” of tissue interproximally can remain even after the orthodontics is completed. A number of research papers (6-8) have now shown the diode laser to be an effective and safe tool for removal of hypertrophic soft tissue around braces, and at times a procedures that may be completed without the need for local anesthesia. Topical anesthesia, particularly where early intervention with the laser is involved, can be completed with minimal discomfort - something that is of great interest to many orthodontic patients.

Protocol Diode Laser Treatment of Gingival Hyperplasia around Orthodontic Brackets.

When using the Picasso Lite and World (7w) lasers for the treatment of gingival hyperplasia around orthodontic brackets, the clinician should first evaluate the amount of keratinized tissue present that is overlying the clinical case and the esthetic demands of the case. In situations where minimal attached tissue is present, careful thought should be given to whether a diode laser is the best tool for the situation. Kravitz et al has suggested that a **minimum of 1mm of attached tissue be present before using the diode laser to ablate tissue.** (9).

Dr. David Sarver wrote a series of three excellent articles looking at the role of the diode laser in orthodontics in 2004 and 2005. In part 1 he looks at the principles of shape and proportionality of anterior teeth. Focus for many general dentists has been on the tooth structure and reshaping incisal edges, but gingival recontouring of soft tissues can yield better length to width proportions on teeth. A focus on ***gingival shape and gingival contour*** is essential when altering soft tissue proportions of anterior teeth. Many of these principles are covered through cosmetic dentistry articles dealing with smile design. Generally, the gingival heights of the maxillary centrals should be symmetrical in shape, and correspond to the height of the canines, whereas the lateral incisors can be 1/2-1mm more coronal. The zeniths of the soft tissue curvature should be slightly distal to the long axis of the teeth, (figure 1) and the width of the tooth should be 75-80% of the length of the tooth. In figure 2, it is easy to see how minor alterations (particularly to the central incisors) can create a dramatic improvement to the esthetics of the case. Therefore, the diode laser can be used to help with 1) improving gingival shape and contour, (2) lengthening crowns, (3) idealizing tooth proportionality, and (4) resolving crown/height asymmetries.

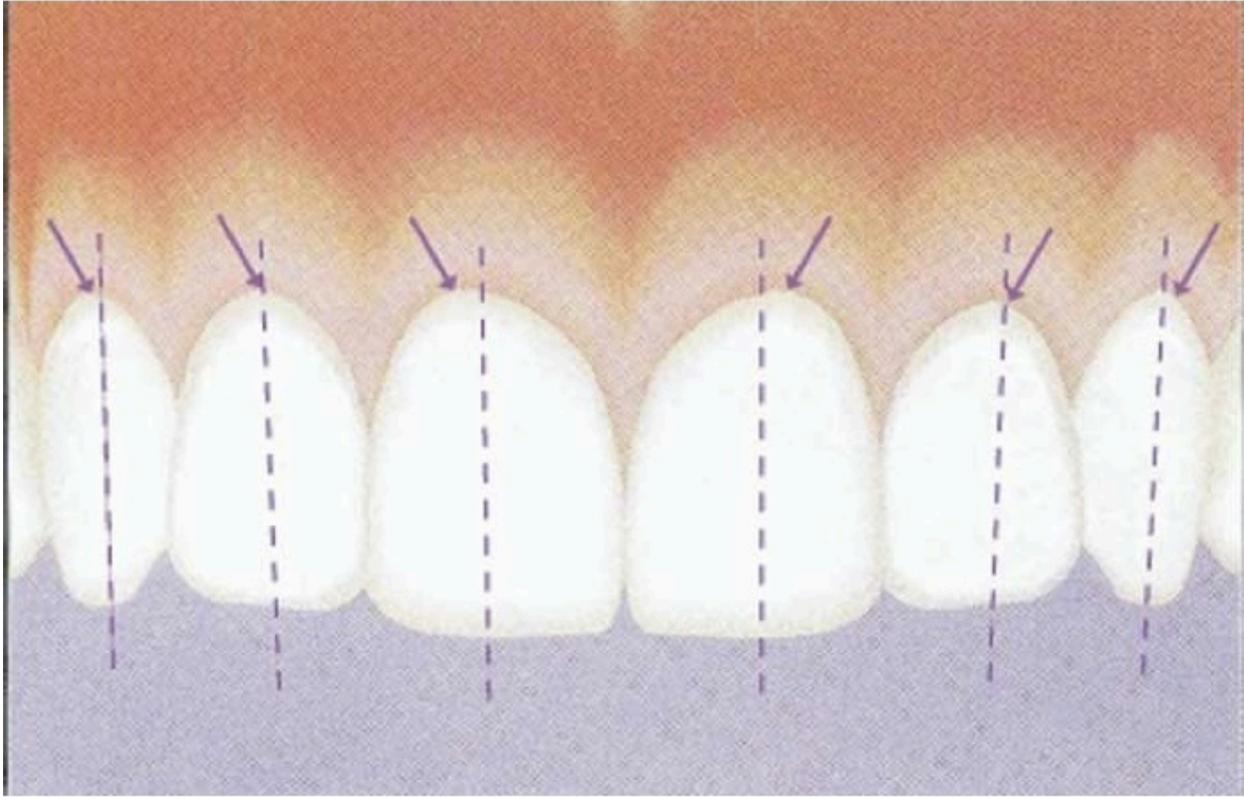


Figure 1 shows recommended zenith placement relative to long axis of maxillary anterior teeth. Courtesy of Dr. David Sarver (reference 11)

Gingival Height and Contour

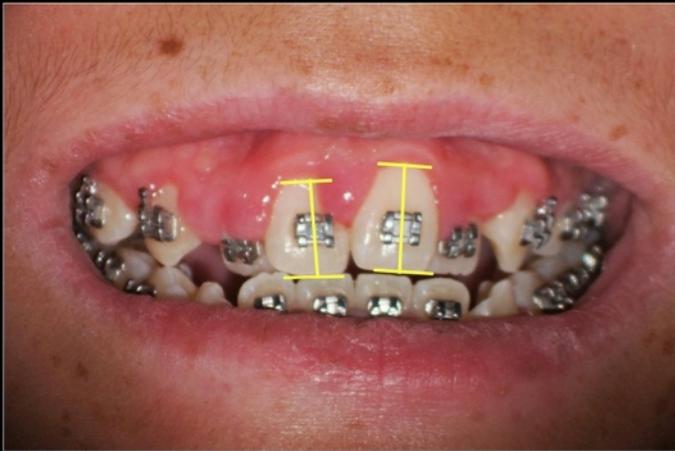


Figure 2 shows before and after of laser recontouring of the central incisors.

As with any other laser procedure where direct contact of the tissue is encountered, the clinician must properly initiate the tip. The author suggests that only in situations where small amounts of soft tissue (0.5-1.5mm) are going to be recontoured should topical anesthetic as a sole source of anesthesia be considered. Several stronger forms of topical such as Cetacaine Gel and liquid (Cetylite Industries Inc- Benzocaine 14.0 %, Butamben 2.0 %, Tetracaine Hydrochloride 2.0 %) can provide enough anesthetic for the laser to be used at **0.6-0.8w CW or 1.2-1.6 watts pulsed** for many patients without too much discomfort. If larger amounts of tissue are being removed or more than 1-2 teeth are involved then local anesthetic is probably the best option for all concerned.

Once initiated, the soft tissue recontouring can be done with a focus on several considerations. It is important to remember that all lasers are **endcutting**, and thus dragging a laser tip too rapidly through inflamed, and hemorrhagic tissue will only frustrate the clinician by creating bleeding or fracturing the laser tip. Although no arcing or sparking interaction will occur if the tip accidentally should touch the bracket, heat can be generated and long term contact of the bracket with the laser tip is not encouraged. A short light brush stroke to “wipe” away the tissue almost painting the tissue away is preferred.

There are two distinct phases to laser gingivectomies in combination with orthodontics. The initial clinical focus should be on “**contouring**” where the clinician attempts to create overall symmetry of the gingival heights and contours. This really is the macro treatment of the overall smile. The clinician can visualize how much tissue is to be removed, and then with an external bevel approach and the laser perpendicular to the tissue remove the tissue in toto. Others prefer to use the laser tip to create many “**dots**” and at the end remove the tissue with a curette. Either way is ok, but the author prefers to use a back and forth motion to remove the tissue en masse. **Settings for contouring with anesthetic should be 0.8-1.4 w CW.** The clinician should stop and view the patient from the anterior and at lower magnifications to “stay on track” as it is easy to create slight cants to a smile when sitting behind and slightly to one side of the patient.

After the initial contouring is completed the 2nd phase of the laser gingivectomy for hyperplastic tissue should look at “**debulking**” the papillae. The process of ***papilloplasty*** involves short vertical brush strokes to “thin” out the papilla thus creating again more harmony to the smile. A light touch is required here to thin out the tissue. If one only focuses on getting symmetry to the overall contour and smile without an attention to the papillae, the tissues will still appear “swollen” after healing has occurred. Debulking typically occurs with slightly lower settings of 0.6-0.8w CW. Make sure to keep the tip clean from debris with a wet gauze, and to frequently stop to re-evaluate how the overall smile is from a symmetry standpoint. Any areas of charred, or carbonized tissue can be removed with hydrogen peroxide on a cotton pellet or brushed on with a microbrush. Patients should avoid spicy foods, use Ibuprofen if needed, and carefully cleanse the area for the next 7-10 days with gentle toothbrushing with a soft

tooth brush and a Chlorhexidine rinse if desired. Systemic antibiotics are not required as the laser is antibacterial in nature.

In situations where the patient is having a gingivectomy after brackets have been removed, attention should be given to providing a better fitting retainer **AFTER** the tissue has been excised. For example the common use of clear essix type retainers can allow for tissue to “rebound” if new retainers are not fabricated after diode laser treatment of soft tissues is completed. Often in the author’s practice alginate impressions for the new retainers are taken immediately after the laser procedure is completed.

Table 1.

Item	Diode Laser Gingivectomies in Orthodontics.
1	View the overall symmetry of the smile focussing on symmetry, height and contour of the edematous tissues.
2	Select disposable 400 micron strippable tip and initiate the tip at 0.5 w on articulating paper for 5-8 seconds on sides and end of tip.
3	Recognize that adequate attached tissue (minimum of 1mm) must be present prior to using the laser. Remove only excess tissue, the diode laser cannot recontour bone.
4	Contouring- in phase 1 the focus should be on treating the gingival sulcus and creating symmetry of height and contour. Use 0.8-1.4 watts CW with light brush strokes to remove the excessive tissue on the facial aspect.
5	Stop frequently and view patient from anterior holding lip away to “stay on track “ and avoid creating asymmetry.
6	Debulking- in phase 2 the focus should be on the interproximal papillae and papilloplasty to thin out the tissue. Short vertical light brush strokes at 0.6-0.8 watts CW will accomplish this task.
7	Hydrogen Peroxide on a cotton pellet or with a brush will remove areas of tissue that are charred or carbonized.
8	Avoid spicy foods, use Ibuprofen (200-400 mg q 4-6 hours) as needed, cold liquids, chlorhexidine rinses, and careful oral hygiene for the first week. Typically patients will feel very little.
9	Reappoint patient at 7-14 days to re-evaluate healing.

Clinical Case



Fig. 3 “macro” view of inflamed tissue around brackets.

Fig. 4 “micro” view same clinical case.



Fig. 5 Immediate postoperative result.

Fig. 6 Eight day healing of clinical case.

CONCLUSION: The advantages of using the diode laser for treatment of gingival hyperplasia associated with orthodontic brackets include the ability to remove tissue with little to no local anesthetic and the lack of interaction with metal brackets, as well as a reduced risk for hemorrhage or sutures being needed. Inflamed tissue tends to increase the risk of caries and food entrapment, and can delay treatment in severe instances, as well as being painful for the patient. Attention to the “macro” environment in phase 1 (contouring) and the “micro” environment (debulking of the papillae) in phase 2 will ensure a long term esthetic and functional result with little to no postoperative discomfort.

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