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Implant uncovery with the Picasso diode laser

By Gregori M. Kurtzman, DDS, MAGD, DICOI, DADIA

Introduction

Dental implants are placed either utilizing a 1-stage approach (healing abutment placed at implant placement) or a 2-stage approach (implant is covered by soft tissue at time of placement) and modification of the soft tissue to expose the implant fully may be required. When the prosthetic phase is initiated, soft tissue to either removed to uncover the implants or reshape the gingival margin for better esthetics which can be accomplished by several methods. A cutting instrument, (ie. Scalpel or tissue punch1) has been the traditional approach to incise through the soft tissue to the underlying implant. The result is a bleeding edge that can interfere with impressions if they are to be taken at the same appointment. Additionally, post-operative sensitivity has been reported and can result from the fresh cut edge. Typically a delay of 2 weeks or longer is required before impressions can be taken so that bleeding doesn't hamper the accuracy of how the soft tissue is captured.

An alternative to the blade, electro surgery has been offered as it can cauterize the cut edges and decrease post-operative bleeding. Yet, this presents with two negatives outcomes to their use in and around dental implants. Electro surgery requires a circuit be formed between the monopolar tip intraorally and the surgical unit with a grounding plate placed on the patient a distance from the oral cavity. When the current is activated it flows between the electro surgery tip through the soft tissue to the grounding plate, completing the circuit with the metallic implant conducting the current along the path.[2] Temperature increases have been reported that when exceeding a threshold of 10 degrees C at the osseous interface with the implant may lead to bone loss and possible de-integration of the implant. A general recommendation is to avoid electro surgery units in and around dental implants.

As electro surgery affects cell layers deep to the surface (deeper penetrating), combined with the temperature increase tissue shrinkage is often reported. 3 Necessitating a delay between uncovery and impressions to allow the cut edge of gingival tissue to stabilize is required so that the gingival margin captured is stable when the prosthetics is returned for insertion.

Increasing diode lasers are being utilized in dental practices both due to lower costs to implement this technology then the more expensive CO2 and ND:YAG lasers and the wide range of effective treatment afforded by these devices. Diode lasers, such as the Picasso (AMD Lasers, Indianapolis, IN, www.amdlasers.com) (Figure 1) provide adequate power to modify soft tissue in and around the dental implant for uncovery or alteration of the gingival margin to improve the esthetics. Additionally, these operate within the temperature range recommended so that the negative effects associated with electro surgery do not occur to the bone around the implant.[4] Coagulation can also be controlled combined with the lack of tissue shrinkage following use of the diode laser allowing impressions to be taken at the time of uncovery. As the diode laser affects fewer cell layers, tissue response does not involve an inflammatory response that can lead to tissue shrinkage during the healing period the first few weeks after treatment.[5-9] (Figure 2)

Utilization of the diode laser

Diode lasers are primarily used in a contact application when cutting or coagulation is required.[10] The diode laser tip is used in either an initiated state or an uninitiated state. Initiated refers to the tip of the diode laser which has been coated with a blocking material. This allows energy from the diode when activated, to heat the tip causing cell ablation (vaporization) at the contact point with cutting resulting.[11] The light energy in the coated tip is converted into heat by refraction of the blocking material on the diodes tip creating a "hot tip". This secondary thermal effect of the heated tip allows cutting or incising of the soft tissue. An area of carbonization at the border of the vaporization results. Coagulation occurs in the tissue bordering this zone of carbonization as a result of contact with the overheated tip rather than by the laser energy itself. (Figure 3) Bacterial decontamination can be accomplished with an initiated diode tip which is useful in treatment of peri-implantitis on the implants surface or within the periodontal sulcus/pocket around implants and natural teeth.

Figure 1: Picasso Diode Laser (AMD Lasers)

Initiation of the tip is accomplished with the diode set at 0.5 watts and touched to a piece of blue articulating paper (Bausch Ref BK05) and the laser is activated for 1 second. This is repeated 6-8 times contacting different areas of the tip so that when finished the entire tip and 3-4mm of the sides has been marked with the articulating paper. It is recommended to avoid articulating ribbon as it will ignite and is ineffective in initiating the tip. A properly initiated tip will glow orange when the foot pedal is depressed.[12] The tip should be wiped with a piece of dry gauze to remove debris periodically as it is being utilized to maintain efficiency. When cutting fibrous tissue it may be necessary to reinitiate the tip during the procedure when the tip appears to not be cutting well.

Cutting efficiency is related to wattage. The higher the wattage, the faster the soft tissue is vaporized. But a greater zone of unwanted lateral thermal damage may result. It is advised to use the lowest wattage to accomplish the task to avoid the risk of thermal damage within the adjacent tissue. The assistant during usage of the diode laser uses the HVE near the site to remove any odors and periodically can spray water on the site to aid in cooling the tissue. This also minimizes thermal issues which improves initial healing. To remove the soft tissue covering the implants cover screw or reshape the tissue for esthetics a setting of 0.8-1.0 watts in a continuous mode is usually sufficient. A 400 micron diode tip (orange) is utilized for oral and periodontal surgical applications. The 300 micron tip (purple) is designed for periodontal applications such as Laser Assisted Periodontal Treatment (LAPT).

Beyond the carbonization zone, an area of hemostasis (coagulation) occurs. Typically sites treated with the diode laser will demonstrate little to no bleeding depending on the condition of the tissue prior to treatment. Tissue that is hemorrhagic will require longer contact with the diode laser to achieve coagulation and may ooze due to the inflammation present prior to laser treatment. The coagulation affects and lack of post treatment tissue shrinkage allow immediate implant impressions should that be desired

The laser also creates an area of biostimulation adjacent to the coagulation area.
Tissues and cells following irradiation with a diode laser, have a

▸Page 2

Figure 2: Comparison of the depth of affected cells with an electrosurgery unit and a diode laser

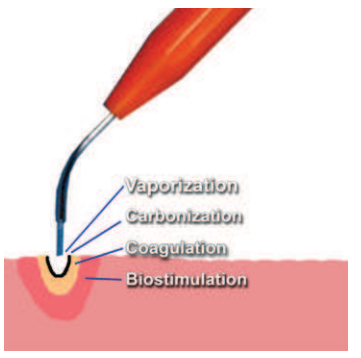

Figure 3: Tissue reaction upon contact with an initiated diode laser tip demonstrating the effect as one moves away from the tip

Figure 4: Implant to be uncovered (A) presents with two options depending on width of attached gingiva available. Wide band of attached gingiva will remain after removal of tissue over cover screw, the diode is utilized in a spiral pattern starting at center until fully exposed (B). Narrow band of attached gingiva present, an elliptical cut is made with the diode and tissue is pushed buccally and lingually to preserve the attached gingiva (C).

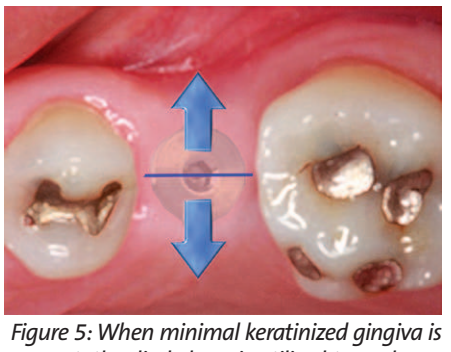

Figure 5: When minimal keratinized gingiva is present, the diode laser is utilized to make an incision distal-mesially and the tissue is spread conserving all of the attached gingiva present.

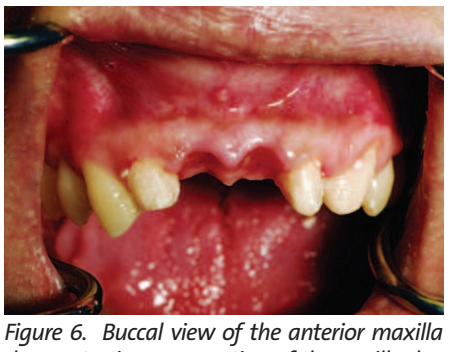

Figure 6. Buccal view of the anterior maxilla demonstrating preservation of the papilla due to the provisional bridge.

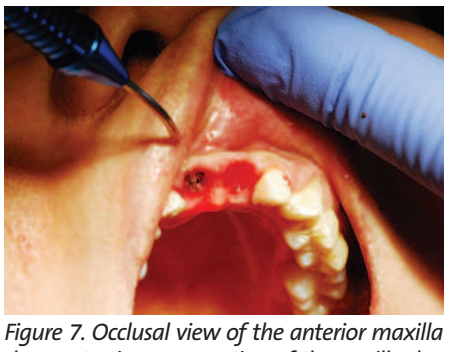

Figure 7. Occlusal view of the anterior maxilla demonstrating preservation of the papilla due to the provisional bridge.

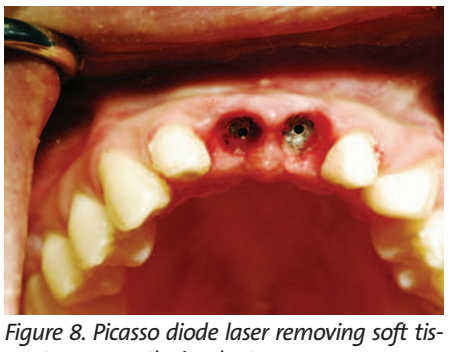

Figure 8. Picasso diode laser removing soft tissue to uncover the implants cover screws.

Figure 9. Uncovery of the implants and healing screws exposed.

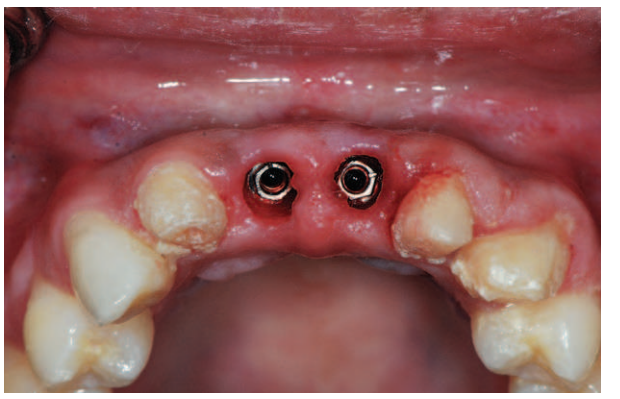

Figure 10. Healing abutments placed into the implants.

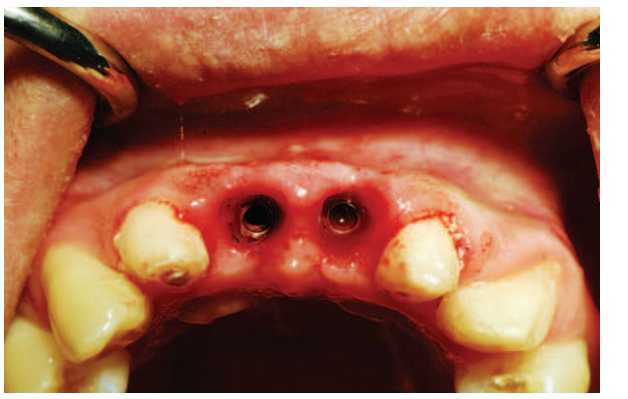

Figure 11. Removal of the healing abutments at 2 weeks post uncovery demonstrating a lack of inflammation of the modified soft tissue.

biostimulatory effect that provides faster or more favorable wound healing, compared to tissue treated with a scalpel or electrosurgical unit. The laser irradiation stimulates the proliferation of mesenchymal stem cells without DNA alterations in the affected cells.[13] Thus, wound healing is enhanced and soft tissue at the cut edges demonstrates faster healing then when treated with a scalpel or other methods by stimulation of gingival fibroblasts inducing growth factors.[14, 15] It has been reported that biostimulation via the diode laser also has a positive effect on bone cells and can be stimulatory to the bone cells at the crest around the implant.[16, 17] Compared to conventional methods tissue healing as well as postoperative sensitivity was less with the diode laser then with other methods.[18]

Implant Uncovery technical considerations

The width of attached gingiva remaining will dictate the best method for implant uncovery. (Figure 4A) When a wide band of attached gingiva is present and a sufficient amount (3mm or greater) will be present after uncovery on both the buccal and lingual then the diode laser is activated and inserted at the center of the site and worked in a spiral pattern outward until the entire cover screw is exposed. (Figure 4B) A curette or other instrument may be necessary to loosen the tissue over the cover screw as the periosteum during implant healing becomes adherent to the titanium cover screw. Sites that present with a narrow width of attached gingiva of 3-5mm at the crests center will require some conservation of the remaining attached gingiva. In this clinical situation, the diode is utilized to remove an elliptical piece of soft tissue over the cover screw and then the tissue is pushed buccally and lingually to preserve the attached gingiva. (Figure 4C) If less attached gingiva is present on either side of the center of the crest then the practitioner will need to preserve all of the attached gingiva present and a conventional flap is recommended to be able to position the tissue in a more apical direction. When this is necessary incisions can be made with the diode laser as an alternative to a scalpel. (Figure 5)

Case report

A 30 year old female patient presented with severely malposed maxillary central incisors tipped facially and a desire for esthetic improvement. A CBCT was taken and noted minimal bone was present over the facial of the central incisors. Options for treatment were presented to the patient which included: orthodontics to correct esthetics or extraction of the central incisors, placement of implants at these sites and restorations on the anterior teeth. The patient indicated that she did not wish to pursue a orthodontic treatment option due to the time involved.

The patient presented for surgery and the central incisors were atraumatically extracted under local anesthetic. The adjacent teeth were prepared for crowns, which would support a provisional bridge during the healing/integration period. A 4mm wide 24 degree Co-Axis implant (Keystone Dental, Burlington, MA) was placed into the osteotomy at each central incisor orienting the prosthetic axis to a vertical position while the implants body followed the trajectory of the premaxilla. A healing screw was placed and osseous graft material (NovaBone, Jacksonville, FL) placed on the facial to thicken the resulting bone. The soft tissue was closed with resorbable PGA sutures. A stent created over the wax-up of the study models that had been modified was filled with an auto-cure provisional resin (Perfectemp 10, DenMat, Lompoc, CA) and seated over the anterior and allowed to set. Upon setting the stent with provisional was removed intraorally and trimmed and polished. The material at the implant sites was shaped to a bullet shape to assist in forming an emergence profile in the soft tissue and preserve the papilla's.

Six months post implant placement the provisional bridge was removed and preservation of the papilla's was confirmed with a natural emergence profile within soft tissue. (Figure 6, 7) Local anesthetic was administered. The Picasso diode laser was set at 2.5 watts in continuous mode with an initiated tip and at the center of the depression in the soft tissue above the implants cover screw and moved in a circular motion moving outward until the entire cover screw was exposed. (Figure 8) The process cuts the desired soft tissue and coagulates any bleeding from the cut edges. This was then repeated on the second implant. (Figure 9) Open tray implant impression abutments were placed into the implants and seating verified radiographically. An impression of the maxillary arch was taken utilizing Aquasil heavy body VPS (Caulk, Milford, DE) in a Mira Advanced Implant tray (Hager Worldwide, Hickory, NC) and Aquasil Ultra syringed around the preparations and implant abutment heads. Healing abutments were placed into the implants. (Figure 10) The previously placed provisional bridge was tried in and modified at the pontics to allow the bridge to fully seat over the healing abutments and luted with a provisional cement (Fuji Temp LT, GC America, Alsip, IL).

Two weeks later the prosthetics returned from the lab (DenMat Labs, Lompoc, CA) and the provisional bridge was removed. The healing abutments were removed and the soft tissue demonstrated a lack of inflammation and a good periodontal health where it had been modified by the diode laser. (Figure 11) Ceramic crowns were tried in on teeth 7, 10 and 11 and the screw retained zirconia based implant crowns inserted. A radiograph was taken verifying fit of the implant prosthetics. A torque wrench was utilized to tighten the fixation screws on the implants to 30 Ncm and the ceramic crowns were luted with Panavia SA resin cement (Kuraray, NY, NY). Occlusion was checked and adjusted where needed.

Conclusion:

Diode lasers are a useful adjunct to soft tissue modification to uncover dental implants or esthetically recontour the gingival margin. They provide better safety then electro surgery maintaining a temperature profile within the safety zone of bone and do not cause tissue shrinkage that can affect the esthetic outcome. As the diodes tip provides simultaneous cutting and coagulation (hemostasis) a clear advantage to the use of a scalpel or tissue punch immediate impressions can be accomplished without site bleeding affecting the accuracy of the capture of the soft tissue contours and position.

References

1. Zetz MR, Quereshy FA.: Single-stage implant surgery using a tissue punch. J Oral Maxillofac Surg. 2000 Apr;58(4):456-7.
2. Wilcox CW, Wilwerding TM, Watson P, Morris JT.: Use of electro surgery and lasers in the presence of dental implants. Int J Oral Maxillofac Implants. 2001 Jul-Aug;16(4):578-82.
3. Goharkhay, K., Moritz, A., Wilder-Smith, P., Schoop, U., Kluger, W., Jakolitsch, S., & Sperr, W. (1999, June). Effects on Oral Soft Tissue Produced by a Diode Laser in Vitro. Lasers in Surgery and Medicine, 401–406.
4. Gherlone, EF. Maiorana C Grrani, .RF. Ciacaglini, R. Cattoni F. The use of an 980-nm Diode and 1064-nm Nd:YAG Liaser for Gingival Retraction in Fixed Prosthsis/ Oral Laser Applications 2004; 4:183-190 DT

The full list of references is available from the publisher.

Dr. Kurtzman
***He** is in private general practice in Silver Spring, Maryland and a former Assistant Clinical Professor at University of Maryland and a former AAID Implant Maxi-Course.*
He is aslo assistant program director at Howard University College of Dentistry. He has lectured internationally on the topics of Restorative dentistry, Endodontics and Implant surgery and prosthetics, removable and fixed prosthetics, Periodontics and has over 460 published articles. He has earned Fellowship in the AGD, ACD, ICOI, Pierre Fauchard, ADI, Mastership in the AGD and ICOI and Diplomat status in the ICOI and American Dental Implant Association (ADIA). Dr. Kurtzman has been honored to be included in the "Top Leaders in Continuing Education" by Dentistry Today annually since 2006 and was featured on their June 2012 cover. He can be reached at dr_kurtzman@maryland-implants.com