

Have Laser? Make a Better Smile

The use of 810nm Wavelength Diode Laser for Maxillary Labial
Frenectomy and Gingivoplasty Prior to Restorative Treatment

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Clinical Case Study

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Credentials

- 1986 graduate of the University Of Detroit School of Dentistry- ranked 1st in class
- Omicron Kappa Upsilon Dental honors fraternity- student inductee
- Fellow- Academy of General Dentistry 2001
- Master- Academy of Laser Dentistry 2016
- Member- North American Association of Light Therapy
- Member- American Association of Oral Systemic Health Professionals
- Member- Academy of Breastfeeding Medicine
- Standard Laser Clinical Proficiency ALD Certification 2003: 810nm diode and 2940nm Er:YAG wavelengths
- Advanced Laser Clinical Proficiency ALD Certification 2015: 810nm diode wavelength
- 30 years of GENERAL dentistry - private practice



Disclosure/Conflict of Interest

I receive no royalties or endorsements from any manufacturers or individuals

Privacy practices (HIPPA) have been adhered to in the presentation of clinical photos/videos presented of my actual patients.

No diagnostic exam or surgical procedure should be initiated with limited knowledge or insufficient technical skills required to practice within an acceptable standard of care. This lecture is for informational purposes only.



Soft Tissue Status

Buccal and palatal mucosa: WNL
Gingiva : pink and stippled

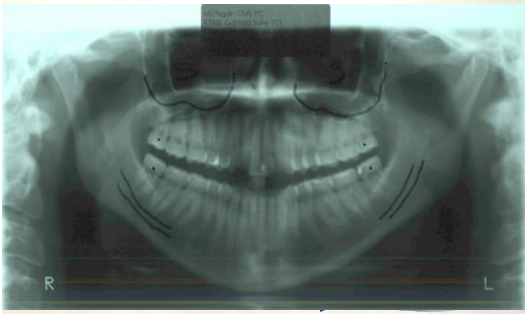
- All natural tooth sites were examined with a periodontal probe and findings recorded.
- **Overall general periodontal status presented a healthy periodontium with no pocket depths noted over 3mm.**
- There was a disparity in gingival heights of contour in the maxillary anterior sextant.
- Of specific relevance was a low, short and fibrous maxillary frenum that was visible when the patient smiled and restricted her smiling.
- The frenum also created tension on the gingival margin of #8 and #9.
- No fistula noted periapical to #8.
- No gingival recession present.

Pre-Operative Periodontal Probing



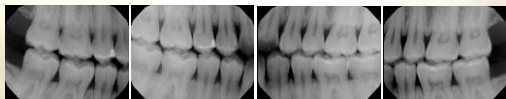
Radiographic Exam:

Panoramic radiograph taken 1/13/2010 by oral surgeon prior to extraction of four third molars.



Bitewing Radiographs

Taken 11/13/2013 revealing #5 disto-occlusal caries and the aforementioned minimal restorations.



Maxillary Anterior PAX: Taken 11/13/2013 demonstrating extensive composite restorations #8, 9 and erosion #7, 10 with widened PDL at apex of #8.



Final Diagnosis

A final diagnosis for laser assisted treatment was made to achieve the following clinical goals:

1. Gingivoplasty to achieve an esthetic gingival balance in this cosmetically sensitive area as teeth #7-10 are prepared for full coverage restorations.
2. Maxillary labial frenectomy to release the tension on the attached gingival when upper lip is elevated.

Maxillary Labial Frenum Assessment*:



Clinical signs	Anatomical Signs
Class I	No perceptible frenum
Class II	Frenum extends onto attached gingiva
Class III	Frenum extends onto attached gingiva between teeth
Class IV	Frenum onto attached gingiva between teeth and wraps onto palate

* Kotlow, L. Lasers in Pediatric Dentistry. Dent Clin N Am 48 (2004), 889-922.

Contraindications

Treatment:

- There were no absolute contraindications for the use of a laser on this patient.
- The use of minimum power parameters, allowing the proper thermal tissue relaxation and reduction of carbonization on fiber tip to helps to avoid overheating of the target tissue or causing collateral thermal damage.
- Char should be removed promptly so as to avoid a 'hot tip' on the fiber.

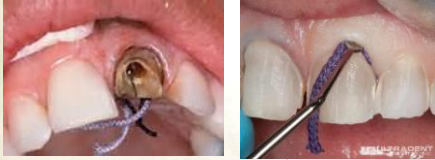
Laser:

- Laser soft tissue treatment does not have any absolute contraindications as long as other medical and dental considerations justify the procedure.
- Laser procedures are subject to the same clinical judgment and care as traditional techniques.

Treatment Alternatives

Conventional gingival retraction cord

- Unpredictable resultant gingival margin, post-operative pain, possible recurrence of bleeding from the sulci after withdrawal of cord.
- In addition, there would be no change in the soft tissue contours of the gingival margins or correction of the low attachment of the maxillary frenum.



Scalpel Gingivoplasty and Frenectomy

- It would result in bleeding which may obscure the field at times, more postoperative discomfort, diet restriction and less precision in sculpting the gingival contours. Ref. 2
- Sutures would be required to close the revision site.
- A longer healing time would be anticipated prior to obtaining final impressions and insertion of restorations to allow for apical migration of the gingival margin and maturation of the frenectomy.



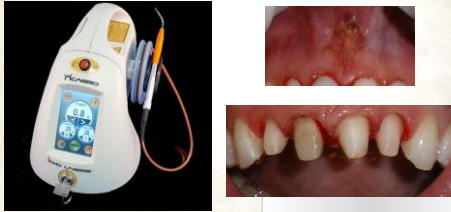
Electro Surgery

- (ES) has been used in dentistry for several years for cutting and coagulation of tissue. Reports of delayed wound healing, osteonecrosis and unsightly carbonized tissue could be a deterrent in this case.
- However, in most literature reviews, the failure to fully define parameters upon how the ES unit was used and if operator error may have contributed to delayed or eventual healing. Ref. 3



Laser Assisted Surgery:

- When proper treatment parameters are utilized, a stable gingival margin, minimal bleeding, lessened post-operative pain, accelerated healing time allowing early placement of permanent coronal restorations.
- This is a substantial advantage in the esthetic zone. The same instrument can also be safely used to accomplish both treatment objectives.



Informed Consent

- Treatment plan and options/alternatives as stated previously were fully explained to patient.
- Pros and cons of treatment and all associated risks were discussed in detail.
- Potential complications and post-operative at-home care was also explained.
- Written and verbal consent and HIPAA consent signed by patient. ANSI and OSHA guidelines followed. Permission was granted for use of photographs, radiographs and other ancillary documentation.

Treatment Objectives

- The objectives of this treatment is to use an 810nm diode laser to **naturally contour the gingival margins of the maxillary anterior sextant.**
- **Revise a lowly attached fibrous maxillary frenum** that is limiting lip retraction and creating tension on the attached gingiva.
- Following the soft tissue revisions, teeth #7-10 will be prepared for full coverage crowns.
- The intention is to perform this treatment with the highest degree of success and lowest peri and post-operative discomfort or complications for the patient.

Laser Operating Parameters

Specifications

Laser unit	Picasso 7W Laser (AMD Lasers, DENTSPLY)
Medium	Solid State Diode (GaAlAs)
Wavelength	810nm (+/- 10)
Power Modes	Continuous or repeat pulse
Pulse Duration	20ms – 9.9 sec
Pulse Interval	20ms – 9.9 sec
Delivery Fiber Diameter	400 micron flexible quartz fiber
Beam Diameter	400 microns
Power and time of laser exposure	Varies with each procedure.
Aiming Beam	LED max 5mW 630-670nm

Standard Operating Protocol

- ✓ Proper signs placed to define operatory as the controlled area for laser use.
- ✓ Laser wavelength specific safety glasses are used by all personnel including the patient.
- ✓ Cleave of fiber tip and insertion into hand piece
- ✓ Test fire the laser – utilizing all safety measures – minimum power setting and directing beam away from reflective surfaces and eyes.
- ✓ Initiation of laser fiber tip



Treatment Delivery, Sequence and Intra-operative Documentation

- Patient records and treatment plan were reviewed.
 - Patient had eaten prior to the dental appointment and had taken no medications.
 - Patient had made appointment for endodontic treatment on #8 for the following day.
 - She is currently asymptomatic.
1. **Topical anesthetic:** 20% topical Benzocaine gel was placed at for 2 minutes in the maxillary labial vestibule.
 2. **Anesthetic:** 4 1.8ml carpules 2% lidocaine w/ 1:100,000epi were infiltrated above the maxillary cuspids and central incisors and allowed to take effect.

Laser Gingivoplasty

A 400 micron fiber freshly cleaved and lightly initiated was used at .9W CW. Floss was used as a guideline for determining esthetic gingiva heights in the maxillary anterior sextant. (#6-11) The soft tissue pocket was explored with a periodontal probe.

The fiber was in light contact with the sulcus avoiding deep penetration. The incision line was lightly developed and short sweeping strokes were with the fiber were used to shape gingival margins to desired esthetic contours teeth #7-10.

Char on the fiber tip was frequently removed. A cotton pellet soaked in .14% chlorhexidine was used to remove any remaining tissue debris. Total estimated time of laser tip contact per site: 30 seconds.

Total Energy Delivered to Each Site Treated:
.9W (Joules/sec) x 30 seconds= 27 J/site

A direct composite mockup of the appropriate contours and lengths of #7-10 was accomplished. A fox plane was used for correct occlusal plane orientation. When the desired tooth contours, over jet and over bite were achieved, fast setting polyvinylsiloxane (PVS) impression was taken of the area to use as a template for temporary restorations.



Teeth #7-10 were prepared ideally with a chamfer margins. A post-operative radiograph was taken of #7-10.



Temporization

- The single unit Cool Temp™ temporary #7-10 was inserted and cemented with Tempgrip™ (DENTSPLY).
- An alginate impression was taken of the maxillary temporized teeth as a guide for the dental laboratory to fabricate a custom acrylic temporary (Biotemp®) over the preparations #7-10 at the 48 hour re- evaluation appointment.
- The custom temporary would allow for improved tissue healing and for critical cosmetic evaluation.
- With the distortion of the smile from the local anesthetic it was difficult to perceive if all contours were correct.

Maxillary Frenectomy

- Local anesthesia delivered from the initial infiltration was sufficient to proceed with maxillary labial frenectomy.
- A 400 micron fiber freshly cleaved and lightly initiated was used at 1W CW.
- The maxillary lip was elevated to place slight tension on the frenum and the fiber directed perpendicular to the tissue to ablate the frenum.
- The lip was elevated firmly to assure no tension remained on the attached gingival.
- A cotton pellet soaked in .14% chlorhexidine was used to remove any tissue debris. Total time taken at site: 1 minute

Total Energy Delivered to Site Treated:
 1W (Joules/sec) x 60 seconds= 60 J/

Pre-op Frenectomy



Immediate post op: Maxillary frenectomy, gingivoplasty and temporization #7-10



Immediate Close-up: Maxillary frenectomy, gingivoplasty and temporization #7-10



Referral

- Though asymptomatic, the patient was to begin a 2-stage endodontic procedure the following day on tooth #8 (necrotic) which would not be completed for one month per the endodontist. One post-operative periapical radiograph was taken and sent to the endodontist with the referral.



- The patient was instructed to schedule an appointment with the dental ceramist for a custom shade for the final restorations #7-10.

Post-operative Instructions

- The patient was given a hand mirror and shown the revision sites. She was asked to perform routine oral hygiene procedures with a soft tooth brush and rinse for the next few days with lukewarm salt water rinses.
- Due to the revision area of the maxillary frenum, the patient was asked to refrain from acidic foods and beverages, alcohol and hard foods that may irritate the wound.
- Over the counter analgesic such as Tylenol® or Advil® was recommended for pain control if needed.
- Patient was contacted the evening of the appointment and was doing well.

Complications

- No complications were encountered during treatment.
- Tissues responded well to laser use technique and parameters.
- The patient could not fully evaluate the smile immediately, due to the residual effects of the local anesthetic, however, she was pleased with the balance of the length and size of her front teeth and ability to freely move her upper lip.
- She was anxious to proceed with the final restorations.

Prognosis

- Laser assisted soft tissue procedures accomplished with proper technique and precautions have a very good prognosis.
- The laser protocols used were favored over traditional surgical methods for correction which would have been more uncomfortable for the patient requiring a longer post-operative healing time, suturing and higher incidence of blood loss.
- In addition, if proper parameters are used, gingiva will remain healthy and stable. Ref. 4

Treatment Records

- All procedural details with reference to laser technique and materials were entered in the patient chart notes along with treatment plan and consent details.
- The treatment records would reflect the treatment outlined above.

FOLLOW-UP

Assessment of treatment outcome

Same Day follow-up:

- The patient was contacted by phone the evening of the appointment and was doing well.
- The patient did not need any pain control medicines.
- Normal oral hygiene measures were to be continued.

24 hours post-op:

- Patient had endodontic procedure started on #8 and was taking antibiotics and Advil.®

48 Hours Post-Operative

- Gingival tissue around all sites #7-10 healing well.
- Frenectomy site was healing well by secondary intention.

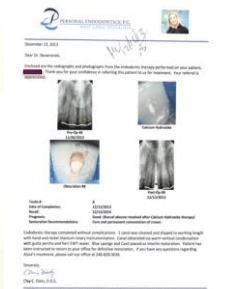


4 Weeks Post-Operative

- Good gingival tissue healing around Biotemp® #7-10 and maturation of frenum.
- Root canal #8 complete with clearance to take final impressions #7-10



Endodontic Narrative Report: Completion of treatment #8



6 weeks Post-Operative

- Excellent gingival tissue contours, and normal probing depths (1-3mm) around #6-11.
- Maxillary frenectomy site well healed with no recurrence of tension on the attached gingiva when lip is elevated.
- Insertion of custom shade e.max® layered crowns #7-10 luted with dual cure NX3 completed

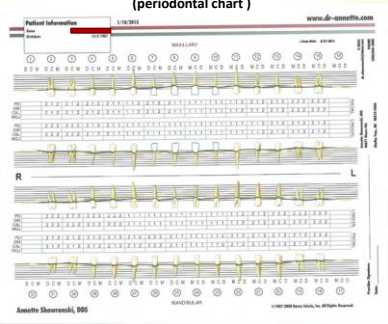


6 Months Post-Operative

- Success of surgical intervention is evident. Gingival contours appear natural around the treated sites #7-10.
- Gingival tissue is pink and stippled.
- Periodontal probing depths within normal limits (1-3mm) interproximal papillae naturally restored.
- No gingival recession evident around crown margins



6 Month Post Op Laser Assisted Gingivoplasty and Frenectomy (periodontal chart)



6 Month Post Operative Laser Assisted Gingivoplasty and Frenectomy



12 Month Post Operative Laser Assisted Gingivoplasty and Frenectomy (perio probings and photos)



Complications

- No long term complications were observed.

Long term results:

- One year post operatively, the gingival contour around the laser treated sites has remained healthy and stable.
- The maxillary labial frenum no longer interferes with the patient's smile nor creates any tension on the gingival margin between #8 and #9 when the maxillary lip is everted.

Long term prognosis

- Excellent** - The patient is aware that she needs to maintain optimal dietary controls and oral hygiene measures to maintain the periodontal health of the treated areas.
- A recurrence of her eating disorder would be detrimental to the adjacent natural teeth especially the maxillary cuspids which had moderate palatal enamel erosions.

**Pre-Operative and 12 Months Post-Operative
Comparative Photos of Gingivoplasty and Maxillary Labial
Frenectomy**

Pre-op

12 Month Post-op



**Pre-Operative and 12 Months Post-Operative
Comparative Photos of Gingivoplasty and Maxillary Labial Frenectomy**



**Pre-Operative and 12 Months Post-Operative
Comparative Photos of Gingivoplasty and Maxillary Labial
Frenectomy**





References

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