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Title:

**LiteTouch Er:YAG Laser Caries Removal and
Gingivoplasty.**

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Academy of Laser Dentistry

Advanced Proficiency Clinical Case Studies

Pre- treatment

A. Outline of case

1. Full clinical description

A 27-year-old female presented on December 11, 2017 for restoration of her maxillary right canine and lateral incisors. Clinical examination revealed extensive caries on the mesial and distal aspects of tooth #7 and on the mesial of #6. The decay extended at least to the gingival margin on the mesial aspect of canine.(Figure1 and 2)

Medical history: The patient was in excellent health. She had no known allergies to any medications and was not taking any medication at the time. There was no history of bleeding or clotting disorders.

Dental history: Last time she had received dental treatment was 3 years prior.

Pre-treatment perio charting: The periodontal pocket did not present any problems figure 3 shows.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Upper Facial		323	323	223	X	212	212	212	212	212	212	X	222	322	222	
Upper Lingual		323	323	323	X	212	212	212	212	212	222	X	323	322	222	
Lower Lingual		222	223	X	322	211	111	111	111	111	212	X	222	222	223	323
Lower Facial		222	223	322	X	211	111	111	111	111	212	X	212	223	323	323
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Figure 3: Preoperative periodontal chart



Figure 1: Preoperative view



Figure 2: Preoperative palatal view



Figure 4: Preoperative radiograph

Occlusion: This patient was class I of the Angle classification.

TMJ: TMJ examination by palpation and radiographic evaluation revealed no abnormalities. The patient had 10mm lateral excursions and a 35mm maximum opening, both normal. She did not deviate on opening and reported no difficulties or sounds on opening or in lateral excursions.

2. Radiographic exam

Periapical X-rays were taken on carious teeth #6, and #7.(Figure 4)

3. Soft tissue status

No bleeding was observed upon probing. The depth of pocket measured by probing was within normal limits.

4. Hard tissue status, tooth vitality

Tooth vitality tests were within normal limits. Hard tissue examination revealed good bone support around teeth #6 and #7.

5. Other tests

Impressions for study models were made.

B. Diagnosis

1. Provisional diagnosis

Moderate to severe caries rate inter-proximally on teeth #6,7 due to the bad restorations.

2. Final diagnosis

Caries of the disto-lingual and mesio-bucco- lingual aspects of tooth #7 and of the mesio- bucco-lingual aspects of #6 were diagnosed.

3. Treatment plan outline

Treatment was recommended for both teeth, using an Er:YAG laser (2940 nm) to evacuate the decay. Removal of restorations teeth #6 and #7. Cavity preparation with Er:YAG laser. Gingivoplasty for getting a good emergence profile of new direct bonding restorations.

4. Indications and contraindications

a. Indications

The Er:YAG laser affords superior treatment in many respects. As compared to the drill, the laser is more comfortable, through reduced tactile and auditory stimulation. Also, at power levels suitable for treating dental decay, healthy tooth structure is not damaged. Gingivoplasty can be performed with good precision at interproximal area for emergence profile of direct bonding restoration.

b. Contraindications

Possible contraindications for laser treatment include difficult access, patient disposition and type of cavity, since the laser is an end- cutting instrument and it is not always possible to angle the tip in an appropriate direction. In this case, there were no apparent contraindications. Hemostasis can be more difficult to achieve with the Er:YAG laser.

5. Precautions

Benefits of using The Er:YAG laser wavelength would enable selective targeting of soft tissue. At the same time, it is appropriate to use minimal power and proper technique, along with rest intervals to allow thermal relaxation to minimize the risk of tissue damage. Good tissue appearance postsurgery would promote predictable healing. After such a procedure, the patient should follow home care instructions to maximize healing and stability, and minimize potential complications.

6. Treatment alternatives

Treatment alternatives included conventional dental treatment for tooth decay, using drill or air abrasion, and either placement of retraction cord or electrosurgery for Gingivoplasty.

7. Informed consent

The dentist and patient discussed advantages and disadvantages of laser treatment as well as alternative treatment prior to the operation. The patient signed the consent form that discussed complications and proper care.

Treatment

A. Treatment objectives strategy

Removal of old resin filling

Cavity preparation

Gingivoplasty for restoration and countering interproximal soft tissue

Restore composite resins to improve plaque control and visual appeal.

B. Laser operating parameters

The Laser used was the Er:YAG laser (Lite Touch, Light INSTRUMENTS LTD, Israel)

1. Wavelength: 2,940 nm
2. Delivery system: Direct Drive Delivery System
3. 800 micron sapphire tip was used with water for the treatment of the caries.
4. Initial settings for caries removal were 300 mJ and 20 Hz for 3 minutes.
5. Afterwards, a lower setting for deep caries removal was used; 120 mJ and 20 Hz for another 3 minutes.
6. Same tip was used for gingivoplasty without water, 50 mJ and 20 Hz, 1 minutes.

C. Treatment delivery sequence

After cleaning of the preparation site and disinfection with acrinol. This treatment was provided under surface anesthesia. (20% ethyl aminobenzoic acid) It was placed from tooth areas #6 to #7, followed by local anesthesia (2% Lidocaine 1/100,000 epinephrine) 3 ml. The laser warning sign was posted before the operation. All people present in the operating room wore protection goggles to protect their eyes. A test fire of the laser was performed to establish correct working and patency of light delivery. A safety area check (only required personnel present, safety warning signs posted, reflective surfaces minimized) was carried out. The patient and all personnel within the above-mentioned safety area were issued protective glasses. High-volume evacuation was used for tissue cooling and suction of removed tissue.

The laser was first test-fired prior to seating the patient in the dental operatory, to check that the water spray and the laser was working. The laser was used to excavate the decay and then to remove a thin portion of gingival tissue on the internal aspects facing the root surfaces. This facilitated the verification of complete excavation of decay and dry for restoration with composite. Water was cutted for gingivoplasty and soft tissue of interproximal area was shaped for direct bonding restoration. Composite was then placed to complete the restorations. Restorations were accomplished using etch (37% phosphoric acid, American Dental Supply) for 15 secs, followed by application of Universal Adhesive, Scotchbond (3M ESPE), MI LOW FLOW A3 (GC), Light-Cured Nanohybrid Flowable Composite. A curing light (Kerr) was used in accordance with manufacturer's instructions with manual checking to ascertain completion of polymerization.



Figure 5: Cavity preparation, palatal view



Figure 6: Cavity preparation



Figure 7: Laser in for sulcular development



Figure 8: Immediate post-treatment



Figure 9: Immediate post-treatment



Figure 10: Pretreatment radiograph

D. Post-operative instructions

The patient was instructed to brush thoroughly at least twice daily and to floss once daily. For any mild discomfort, the patient was advised to take over-the-counter pain medication.

E. Complications

No complications occurred. Postoperative discomfort was minimal and no medication was prescribed.

F. Prognosis

All objectives of treatment were met and the prognosis was considered excellent.

G. Treatment records

The kind of the laser and the wavelength, the parameter and the intraoral photograph, the X-ray and the examination of tooth lap were kept on file.

The treatment record accurately contains the treatment sequence.

Follow up

A. Assessment of treatment outcome

No side effects were observed. The patient had no pain.

1. Post-treatment perio charting

The periodontal pocket did not have the problem as figure 11 showed it.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Upper Facial		222	223	222	X	111	112	111	111	211	211	X	222	222	222	
Upper Lingual		222	222	222	X	111	111	111	112	111	111	X	222	222	222	
Lower Lingual		222	222	222	X	111	111	111	111	111	111	X	222	222	222	222
Lower Facial		222	222	222	X	111	111	111	111	111	111	X	112	222	222	223
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Figure 11: Periodontal charting at three-months

2. Specify treatment assessment intervals

Follow-up assessment was carried out during the 3 months after treatment. Pulp tests proved positive. The patient was pleased with the esthetics and was reminded to maintain optimal oral hygiene.

B. Complications

There were no side effects or complications.

C. Long term results

Long-term results were observed to be good with continued 6-months recall visits. All teeth retained vitality and esthetics, and the restorations appeared unchanged from time of placement.

D. Long term prognosis

The measures using the Er:YAG laser went very well. Prior to the procedure the patient had considerable difficulty and discomfort chewing food, but having chosen a laser procedure, not only did the condition of her dental health improve but she was relieved to be free of the stress of undergoing medical treatments.



Figure 12: Three-month postoperative view



Figure 13: Three-month postoperative view



Figure 14: Three-month of periapical radiographs



Figure 15: Six-month



Figure16: Six-month