



Laser Periodontal Therapy for Bone Regeneration



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Historical Perspective

For more than 20 years free-running pulsed Nd:YAG lasers have been used for periodontal treatment.^{1,2} Drs. Robert Gregg and Delwin McCarthy of Millenium Dental Technologies developed the Periolas MVP-7 Nd:YAG laser and the Laser Assisted New Attachment Procedure (LANAP) technique/protocol. LANAP provides dentists with a specific protocol and FDA clearance for the cementum mediated new attachment to the root surface in the absence of long junctional epithelium. Consistent probing depth reduction and the potential for clinical new attachment and radiographic bone growth for periodontally compromised teeth is provided.^{3,4}

With the LANAP technique, the scalpel is replaced with a 360 micron quartz fiber. The Nd:YAG laser transmits light energy through the fiber to target areas in the pocket. Ablation of diseased tissue and antiseptic hemostasis is achieved by varying power, pulse duration, and repetition to provide the desired tissue interaction. Due to the precision and minimally invasive nature of the surgical treatment, there is minimal patient discomfort and post-surgical recovery time. Sutures are not necessary.

An eight-year retrospective review of LANAP demonstrated an average increased bone density of 38% and all pockets reduced an average of 40%.⁵ A human histological study comparing LANAP using the Periolas MVP-7 to scaling and root planing without using the laser was published in 2007. Twelve single-rooted teeth with moderate to advanced chronic periodontitis associated with subgingival calculus deposits were treated. All teeth were scaled and root planed with ultrasonic and hand scalers. Six of the teeth received treatment of the inner pocket wall with the laser (LANAP). The tooth roots were then removed en bloc three months later and evaluated histologically. The LANAP-treated teeth exhibited greater mean probing depth reduction and greater clinical probing attachment level gain than the teeth that were only root planed. All six LANAP-treated teeth showed new cementum and new connective tissue attachment, whereas five of the six teeth that were only root planed healed with only a long junctional epithelium; the sixth showed only slight new cementum formation. There was no evidence of any adverse histologic changes to the root surface or the pulp of any of the teeth.⁶

CASE REPORT

The patient was a 48-year-old healthy female. Her past medical history was negative except for an allergy to Cephalexin. She indicated she smoked. She initially presented to her general dentist for a complete exam. An acute periodontal problem was present in the mandibular anterior area and the gingival tissues were red, somewhat puffy, and tender to palpation (Figure 1). Tooth number 24 was slightly sensitive to percussion. She was prescribed Clindamycin 300 mg q.i.d. and Chlorhexidine 0.12%. The patient was referred for periodontal evaluation.

Periodontal examination included a complete periodontal charting. Probing depths of at least 6mm were noted in multiple areas in each of the four quadrants of the mouth, but the most severely affected area of the mouth was the mandibular anterior. Probing depths ranged up to 7mm in this area, and bleeding and suppuration upon probing were noted, especially associated with numbers 24 and 25. Numbers 24 and 25 exhibited a 2 mobility using the Miller index. A periapical radiograph demonstrated severe loss of alveolar bone (Figures 2 and 3). The patient was advised that numbers 24 and 25 had a very guarded prognosis and would likely need to be extracted. She reported three other teeth had been extracted approximately one year previously and requested that anything be done to possibly retain 24 and 25 for as long as possible.

After discussion with the patient, it was decided to do laser therapy using the Periolas MVP-7 following the FDA-approved LANAP protocol (Figure 4). Treatment of the mandibular quadrants was done first in order to include the area of most immediate concern (numbers 22 to 27). After obtaining anesthesia, an initial pass was made in the pockets with the 360 micron fiber using a 100 micro-second pulse duration. After this initial pass, deposits were removed from the root surfaces using a piezo-electric scaler and three different tips. The last part of the scaling process included using a small-diameter tip and breaking through the periodontal attachment and contacting the bone. After completion of the scaling process, a second pass was done with the laser using a pulse duration of 650 micro-seconds. The second pass created a clot in the pockets. The occlusion was checked and adjusted as necessary to eliminate trauma. The average energy



FIGURE 1

Teeth	27		26		25		24		23		22							
Probing Depth	L	M	D	M	L	M	L	M	L	M	L	M						
Probing Depth	4	3	5	3	6	3	5	7	3	4	3	4	4	3	4			
Probing Depth	3	2	6	6	2	5	6	4	6	7	3	4	4	2	6	6	2	3
Mobility				1			2		2				1					
Furcation																		
Recession	B1				B2				L2				L3					
Recession									B1	L2			B1	L2				

FIGURE 2



FIGURE 3

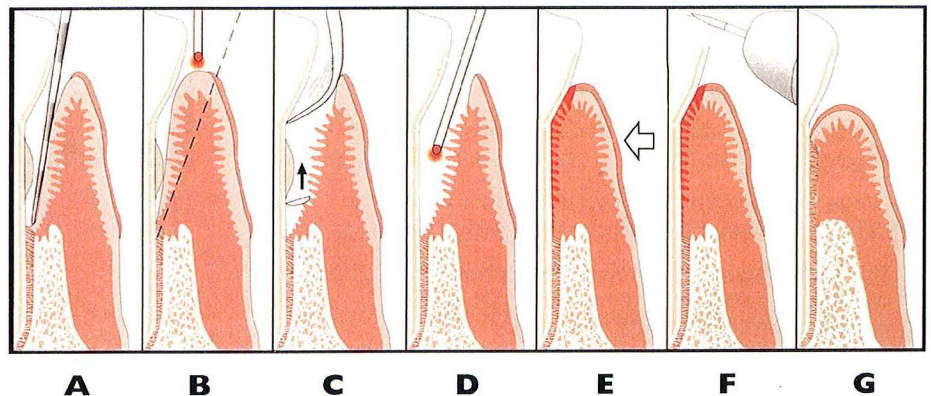


FIGURE 4

used was 12.06 joules per millimeter of pocket depth. Post-operatively the patient was prescribed Ibuprofen 800mg for discomfort, Chlorhexidine 0.12 % rinse, and Periostat (Doxycycline Hyclate 20mg).

The patient did very well after the procedure and, when contacted the next day, reported minimal discomfort. The treated areas were checked and the teeth were polished at one week and three weeks after surgery. The patient resumed brushing the gingival tissues and flossing at 10 days after surgery. She was placed on a three-month maintenance interval.

At approximately six months after her initial examination, a radiograph was taken of the mandibular incisors, and the area was evaluated clinically. The radiograph showed a definite increase in bone density and what appears to be an increase in bone height between numbers 24 and 25 (Figure 5). Clinically the gingival tissues appeared much healthier with no bleeding or suppuration upon probing, and probing depths were reduced as well as mobility (Figures 6 and 7). The patient was satisfied.

The ultimate goal of periodontal treatment is regeneration of bone and the formation of new cementum and new connective tissue attachment. Many techniques and materials have been developed to help achieve this goal. The LANAP protocol is a less invasive and more easily tolerated procedure that shows promise in achieving regeneration of periodontal support. The case report presented in this paper demonstrates a good clinical result, but without histologic examination the formation of new bone, new cementum and new connective tissue cannot be confirmed.

1. Myers TD, Myers WD, Stone RM. First soft tissue study utilizing a pulsed Nd:YAG dental laser. *Northwest Dent.* 1989;68:14-17.
2. White JM, Goodis HE, Rose CL. Use of the pulsed Nd:YAG laser for intraoral soft tissue surgery. *Lasers Surg Med.* 1991;11:455-461.
3. Gregg RH II, McCarthy D. Laser periodontal therapy: case reports. *Dent Today.* Oct 2001;20:74-81.
4. Gregg RH II, McCarthy D. Laser periodontal therapy for bone regeneration. *Dent Today.* May 2002;21:54-59.
5. Harris DM, Gregg RH II, McCarthy DK, et al. Laser assisted new attachment procedure in private practice. *Gen Dent.* 2004;52:396-403.
6. Yukna RA, Carr RL, Evans GH. Histologic evaluation of an Nd:YAG laser –assisted new attachment procedure in humans. *Int J Periodontics Restorative Dent.* 2007;27:577-587.

About Dr. Hindman

Dr. Robert Hindman maintains a practice limited to Periodontics with West 10th Dental Group in Indianapolis and can be reached at 317.247.9512 for comments. He is also an Assistant Clinical Professor of Periodontics at the Indiana University School of Dentistry.



FIGURE 5



FIGURE 6

tooth Number	27		26		25		24		23		22		
Pocket Depth	L	3	1	3	3	1	3	2	2	3	2	1	3
	B	3	1	3	3	1	3	3	1	3	3	1	2
Mobility			I		I		I						
Furcation													
Recession	B1		B2		L2		L3		B1 L2		B1 L2		

FIGURE 7

PROCEED TO THE NEXT PAGE FOR A
**1-CREDIT CE QUIZ FOR
 THIS ISSUE** →

CE Quiz

- Vital hardware components for a digital practice include all of the following, except:*
 - Dedicated Server
 - Clerical and Clinical Workstations
 - Tablets/iPads
 - Monitors (1080p)
- Implementation of technology is suggested to occur in which order?*
 - Hardware, Software, then Imaging Software
 - Software, Hardware, then Imaging Software
- Microsoft Office and Quickbooks are two more important pieces of integral software to implement.*
 - True
 - False
- The two sites of obstruction in sleep apnea have been acknowledged to be:*
 - The tongue and uvula
 - The lips and nasal cavity
 - The palate and oropharyngeal structures
- Other signs of sleep disordered breathing include:*
 - Sleepiness
 - Snoring
 - Unresolved hypertension
 - Observed apneic episodes
 - All of the above
- People with sleep apnea may have these comorbidities, except:*
 - Heart disease
 - Depression
 - Manic episodes
 - Diabetes
- The most common prescription for the therapy of sleep disordered breathing is the CPAP.*
 - True
 - False
- LANAP provides dentists with a specific protocol and FDA clearance for the cementum mediated new attachment to the root surface in the absence of long junctional epithelium.*
 - True
 - False
- Ablation of diseased tissue and antiseptic hemostasis is achieved by all of the following, except:*
 - Increased heat
 - Varying power
 - Pulse duration
 - Repetition
- A neightyearretrospectivereviewoftheLANAPby Harris, et. al, demonstrated an average increased bone density of 80% and complete elimination of pockets.*
 - True
 - False

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I attest that I carefully read this article and ethically completed the quiz.

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