Using a Variable Pulsed Nd:YAG Laser to Treat Periodontal Disease

A less invasive and painful option for achieving periodontal stability

Charles R. Braga, DMD, MMSc

The LANAP® protocol (Millennium Dental Technologies, Inc., www.lanap.com) is an innovative, surgical doctor–mediated therapy for treating periodontal disease. An FDA-cleared protocol that provides cementum-mediated new periodontal ligament attachment to root surfaces in the absence of long junctional epithelium, LANAP® therapy employs a free running, variable pulsed Nd:YAG laser (PerioLase® MVP-7™, Millennium Dental Technologies, Inc.) to promote regeneration without resection, which would ordinarily require a scalpel and sutures.

Examining the Research

Research has demonstrated that when periodontal pocket walls are treated with this laser to remove diseased epithelium and sealed via a laser-generated blood clot, greater probing depth reduction and clinical probing attachment level gains are achieved compared with control teeth treated only with scaling and root planing. New cementum and connective tissue attachment are observed with no evidence of adverse histologic changes of the treated areas.[1]

These findings have been confirmed in research examining the healing response provided by the LANAP protocol. Research has demonstrated the procedure's ability to induce periodontal regeneration.[2] The therapy was performed using a 360-µm diameter fiber with laser output settings at 4.0 W, energy density of 1,965 mJ/mm², 100-µs pulse duration, and 20 Hz to achieve epithelial ablation from the gingival margin to the base of the pocket parallel to the root surface. The laser was moved laterally and apically to remove diseased epithelium. Aggressive scaling and root planing with piezo-electric ultrasonic instrumentation followed. A second pass with the same laser, but at a 650-µs pulse duration, was performed from the apical extent of the bone defect to the gingival margin to obturate the pocket with a laser-produced blood clot. After 9 months of healing, histologic evaluation showed periodontal regeneration with new cementum, periodontal ligament, and alveolar bone, among other positive treatment effects.[2]

Because periodontal therapy aims to assure tooth retention, another study investigated tooth survival over time in patients who underwent LANAP treatment. LANAP therapy effectiveness as a primary treatment for periodontitis (eg, Types III and IV) compared favorably with conventional surgical approaches when tooth loss, need for retreatment, outcome classification, and stability were examined over time.[3]

More than 100 million American adults have moderate to severe periodontal disease, yet less than 3% receive definitive treatment. Those who undergo conventional treatment often experience painful procedures that remove healthy gingival tissue. With the PerioLase MVP-7 and the LANAP protocol, general practitioners and periodontists can provide patients with a significantly less painful and less invasive alternative to conventional scalpel/suture flap surgery.

LANAP treatment provides a number of other benefits over traditional surgery, including reduced postoperative pain, fewer appointments, and easier recovery time. Unlike conventional flap surgery, LANAP treatment usually requires only one to two sessions, each lasting 2 to 3 hours. Patients can often return to their regular daily activities immediately after the procedure.

Case Presentation

A 54-year-old man presented requesting LANAP therapy after years of agreeing only to nonsurgical therapy (ie, scaling and root


FIG. 1


FIG. 2

CASE PRESENTATION (1.) Pretreatment radiograph of the lower left posterior sextant. **(2.)** Post-treatment radiograph of the lower left posterior sextant.

CHARLES R. BRAGA, DMD, MMSC
Private Practice
Merrimack, New Hampshire

Certified Instructor
Institute for Advanced Laser dentistry
Cerritos, California

planing) and periodic maintenance recall to treat his periodontal condition. A longtime heavy smoker, he candidly admitted that quitting was not a feasible reality for him. Concomitantly, he suffered from poorly-controlled type II diabetes and moderately controlled hypertension.

Inflammation was noteworthy, and bleeding on probing was generalized. Clinical and radiographic examination demonstrated hallmarks of advanced periodontitis, including pocketing to 10 mm, bone loss, crestal irregularities, widened periodontal ligament spaces, loss of laminae durae, and furcation involvement (Figure 1).

The LANAP protocol was employed with the PerioLase MVP-7 laser, which was specifically designed for this treatment technique. The operator-selectable pulse durations, ranging from 100 to 650 µs, allowed optimum ablation and hemostasis. The bendable cannula of the fiberoptic handpiece facilitated access to the distal aspect of the molars and hard-to-reach areas.

The laser fiber was inserted between the teeth and gingival tissues. Diseased epithelium was ablated without conventional incisions or sutures. Tooth roots were thoroughly scaled and planed to remove calculus, after which another pass of the laser was performed at a different setting to create a stable, firm blood clot to seal the pocket. Because LANAP treatment assists with fibrin clot formation between the teeth and gingival tissues to initiate attachment, the procedure helped stimulate the patient's immune system and facilitate the healing process.

A postoperative medication regimen included doxycycline 100 mg twice daily for 10 days, ibuprofen 800 mg four times a day for 1 week, and chlorhexidine gluconate 0.12% twice daily/30 seconds for 10 days. Per the LANAP protocol, occlusal adjustment was performed during therapy and follow-up visits.

Although the patient continued to smoke and his diabetes and hypertension remained poorly controlled, noteworthy advances toward periodontal stability were observed 2 years later by comparing pretreatment time zero and re-examination clinical and radiographic findings (Figure 2 and Table 1). These included probing depth and inflammation reduction, shrinkage of periodontal ligament spaces, improvement in lamina dura quality, and osseous changes compatible with defect fill.

Conclusion

This case demonstrates how LANAP protocol with the PerioLase MVP-7 enables general dentists and periodontists to provide patients with moderate to severe periodontal disease with a significantly less painful and invasive alternative to conventional scalpel/suture flap surgery. The benefits of LANAP treatment with PerioLase MVP-7 include fewer appointments, easier recovery time, and long-term tooth retention.

Disclosure

The author discloses that he teaches for Millennium Dental Technologies, but no honorarium was received in the preparation of this article.

References

1. Yunka RA, Carr RL, Evans GH. Histologic evaluation of a Nd:YAG laser-assisted new attachment procedure in humans. *Int J Periodontics Restorative Dent*. 2007;27(6):577-587.
2. Nevins ML, Camelo M, Schupbach P, et al. Human clinical and histologic evaluation of laser-assisted new attachment procedure. *Int J Periodontics Restorative Dent*. 2012;32(5):497-507.
3. Tilt LV. Effectiveness of LANAP over time as measured by tooth loss. *Gen Dent*. 2012;60(2):143-146.

TABLE 1

Pretreatment and post-treatment findings

TOOTH #	24			23			22			21			20			19			18		
PRETREATMENT																					
Facial	4	3	5	5	4	5	5	4	5	5	5	5	5	5	6	6	9	6	6	5	9
Lingual	5	4	5	5	5	5	5	5	6	6	5	5	5	5	6	6	6	10	10	9	10
Recession																3			1		
Furcation																B3	L3		B2	L2	
POST-TREATMENT																					
Facial	3	2	3	3	2	3	3	3	3	3	4	5	3	5	6	3	4	6	6	3	6
Lingual	3	2	3	3	3	3	3	3	4	3	3	3	6	5	6	4	4	6	5	6	6
CHANGE IN POCKET DEPTH AFTER TREATMENT																					
Facial	1	1	2	2	2	2	2	1	2	2	1	0	2	0	0	3	5	0	0	2	3
Lingual	2	2	2	2	2	2	2	2	2	3	2	2	-1	0	0	2	2	4	5	3	4