



Periodontal Regeneration in Humans Following the Laser Assisted New Attachment Procedure (LANAP)

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ABSTRACT

Objective: The Laser Assisted New Attachment Procedure (LANAP) has been advocated for the sulcular debridement of periodontal pockets with the goal of obtaining new attachment. Clinical case reports have reported favorable clinical results, but there is no human histologic proof of regeneration.

Methods: 3 patients with 2 single-rooted teeth with moderate-advanced chronic periodontitis associated with subgingival calculus deposits were enrolled. Occlusal adjustment and direct bond extracoronary splinting was performed. Under local anesthesia, a 1/4 round bur notch was placed at the apical extent of calculus as carefully as possible. One of each pair of teeth received Nd:YAG laser treatment of the inner pocket wall to remove the pocket epithelium (laser settings were 3 watts, 150 pulses/second, 10 hz).

Both teeth were then aggressively scaled/root planed with an ultrasonic scaler. The pocket of the test tooth was lased again to coagulate any blood present and to form a pocket seal. Triple antibiotic ointment and a light cured dressing was placed. Control teeth received all of the above except the laser treatment. The patients were seen every 10 days for the first month, then at 2 and 3 months, at which time the treated teeth were removed en bloc for histologic processing. Decalcified step serial sections were stained with H & E.

Results: 2 of the 3 LANAP treated specimens showed new cementum, new bone, and new periodontal ligament in and coronal to the notch. The control teeth had a long junctional epithelium with no evidence of regeneration. There was no evidence of any adverse pulpal or tooth surface changes in either specimen.

Conclusion: This report supports the proof of principle that LANAP can be associated with periodontal regeneration on a diseased root surface in humans. Supported by Millennium Dental Technologies and the Louisiana Periodontics Support Fund.

INTRODUCTION

Interest in Nd:YAG laser use in periodontics is increasing. A procedure called Laser LANAP has been promoted in trade journals with examples of radiographic bone regeneration. Referred to as Laser Assisted New Attachment Procedure (LANAP) in this report, this technique of sulcular debridement has recently been approved by the FDA. This technique utilizes a free running neodymium: yttrium-aluminum-garnet (FR Nd:YAG) laser applied twice. At the start of the procedure, sulcular wall debridement is accomplished using settings of 3 watts, 150 pulses/second, 10hz. After root debridement by hand and ultrasonics, a final laser application for hemostasis and coagulation with settings of 4 watts, 635 pulses/second, 20hz is used.

In clinical case reports, the LANAP has demonstrated improved clinical measurements and some radiographic evidence of bone regeneration in the areas treated. It is not known what tissues constitute the new healed interface between the soft tissues and the tooth root. Also, there is some evidence that the use of lasers in periodontal pockets may damage root surfaces, adversely affect the adjacent alveolar bone, or cause adverse pulpal changes.

The purpose of this paper is to report the histologic wound healing following use of LANAP therapy of periodontal pockets, to determine the effect on the pocket wall and associated tooth root, and the repair process between the two. LANAP plus scaling and root planing was compared to scaling and root planing without LANAP in three patients.

RESULTS

Figure 1

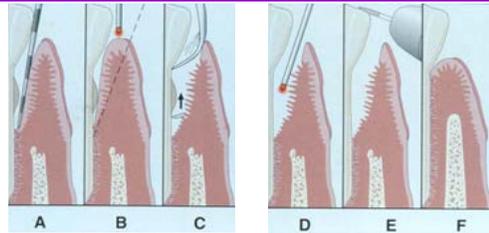


Figure 1 – LANAP technique illustrating removal of pocket epithelium with free running Nd:YAG laser, followed by root surface debridement with hand and ultrasonic instruments.

Initial settings: 3.0 watts, 10 hz, 150 pulses/second
 Final settings: 4.0 watts, 20 hz, 635 pulses/second

Figure 3



Figure 3a - Pre and 3 months post-treatment radiographs of LANAP on tooth #6
 3b - Pre and 3 months post-treatment radiographs of Control tooth #11

Figure 2



Figure 2 – Clinical photographs of LANAP treated tooth #20 and Control tooth #21

A - Pre-operative appearance; Probing depth of 10 mm on #20 and 9 mm on #21
 B - Immediate post-operative appearance
 C - 3 month post-op appearance. Residual probing depth on #20 was 3 mm and #21 was 4 mm.

Figure 4

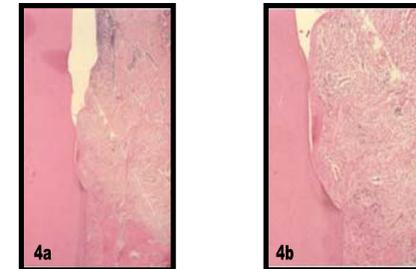


Figure 4 – LANAP treated tooth 3 months post-treatment
 4a – Overview showing calculus notch with new cementum, apical extent of JE, and slight new bone formation. 10X
 4b – Higher power view of notch area demonstrating new cementum, C.T. attachment, and alveolar bone formation. 40X

CONCLUSIONS

This report supports the proof of principle that LANAP can be associated with periodontal regeneration on a diseased root surface in humans.