1735 Laser-assisted Periodontal Regeneration in Humans. Proceedings of the 81st General Session of the International Association of Dental Research (IADR); Göteborg, Sweden; June 25-28, 2003; Laser-assisted Periodontal Regeneration in Humans; R.A. YUKNA, G.H. **EVANS**, S VASTARDIS, R.F. Louisiana State University, New Orleans, USA

Periodontal Regeneration in Humans Following the Laser Assisted New Attachment Procedure (LANAP): Technical Report to Sponsor

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Sponsors: Millennium Dental Technologies and the Louisiana Periodontics Support Fund.

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.

Three patients each with 2 single-rooted teeth with moderate-advanced chronic periodontitis (probing depth 5-8 mm, clinical attachment loss 4-8 mm) associated with subgingival calculus deposits were enrolled. Occlusal adjustment and direct bond extra-coronal splinting was performed. Under local anesthesia, a 1/4 round bur notch was placed at the clinically measured 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. The laser settings were 3 watts, 150-µsec pulses, 10-Hz. Both teeth were then aggressively scaled and root planed with a piezoelectric ultrasonic sealer and hand curettes. The pocket contents of the test teeth were lased again (4 watts, 635-µsec pulses, 20-Hz) to help coagulate any blood present and to form a pocket seal. Triple antibiotic and a light-cured dressing were placed. The control teeth received all of the above but did not receive laser treatment. All patients were provided with non-steroidal anti-inflammatory medications (almost none were used), doxycycline 100 mg daily x 10 days, and 0.12 chlorhexidine rinses b.i.d.

Patients were seen every 10 days for the first month then at 2 and 3 months to evaluate healing, review oral hygiene, and remove plaque. At three months the treated teeth were removed *en bloc* for histologic processing. Decalcified step serial sections were stained with H & E.

Two of the three LANAP treated specimens showed new cementum, new bone, and new periodontal ligament in and coronal to the notch. The other laser treated specimen and all 3 control teeth had a long junctional epithelium with no evidence of regeneration. There was no evidence of any adverse histologic changes to the root surface or the pulp of any of the teeth.

Clinical healing was very good for the LANAP treated teeth and moderately good for the control teeth. LANAP treated teeth exhibited greater mean probing depth reduction (4.7 mm vs. 3.2 mm) and greater clinical probing attachment level gain (4.1 mm vs. 2.1) than the control teeth. There were no adverse clinical events with either treatment.

These cases support the proof of principle that the Laser Assisted New Attachment Procedure using a free running Nd:YAG laser can be associated with periodontal regeneration on a diseased root surface in humans.

Clinical examples are shown in Figure 1, radiographic data are shown in Figures 2 and 3, and typical histologic findings are shown in Figures 4, 5 and 6.

This study was supported by Millennium Dental Technologies and the Louisiana Periodontics Support fund.

Respectfully submitted,

Raymond A. Yukna

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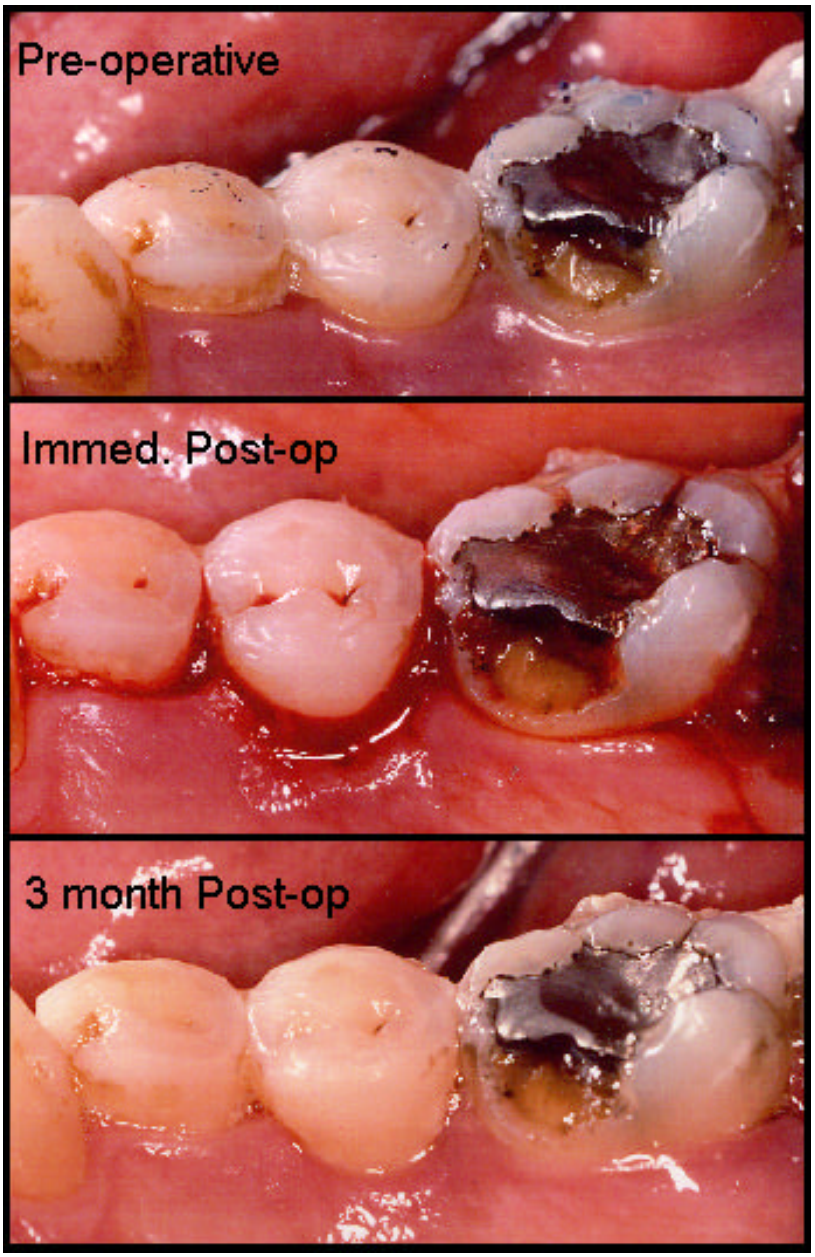

Figure 1. Clinical photograph of LANAP treated tooth #20 and control tooth #21.

Preoperative appearance of teeth and tissues. Probing depth of #20 was 10-mm and #21 was 9-mm.

Immediate post treatment appearance.

Three month post-operative appearance. Probing depth on #20 was 3-mm and #21 was 4-mm.

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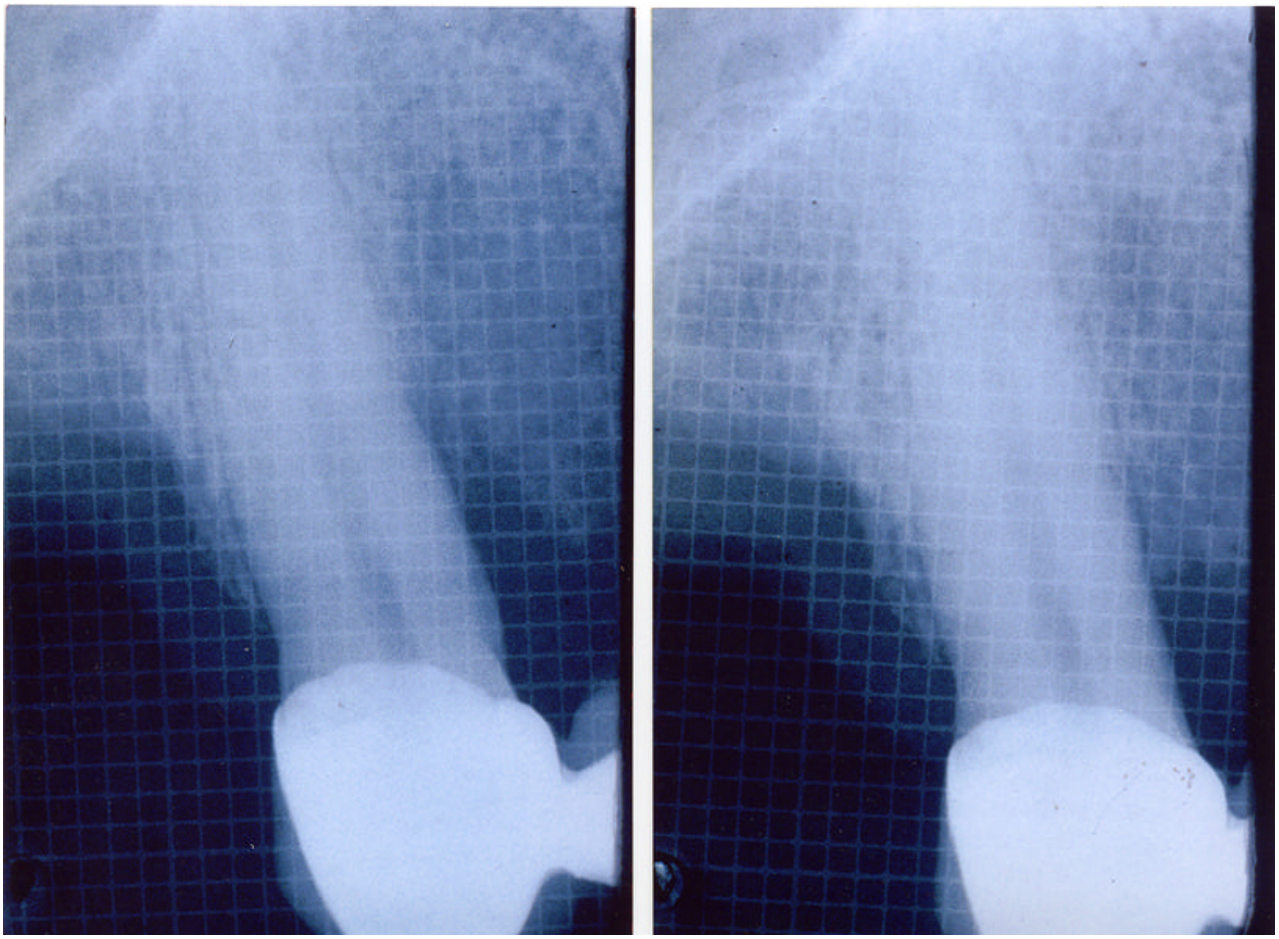

Figure 2. Radiographs of tooth #6 treated with LANAP procedure.

Left: Preoperative radiograph exhibiting 4mm vertical bony defect on mesial. Probing depth was 7mm.

Right: Three month post-treatment film demonstrating radiographic fill of bony defect. Post-treatment probing depth = 3.5 mm.

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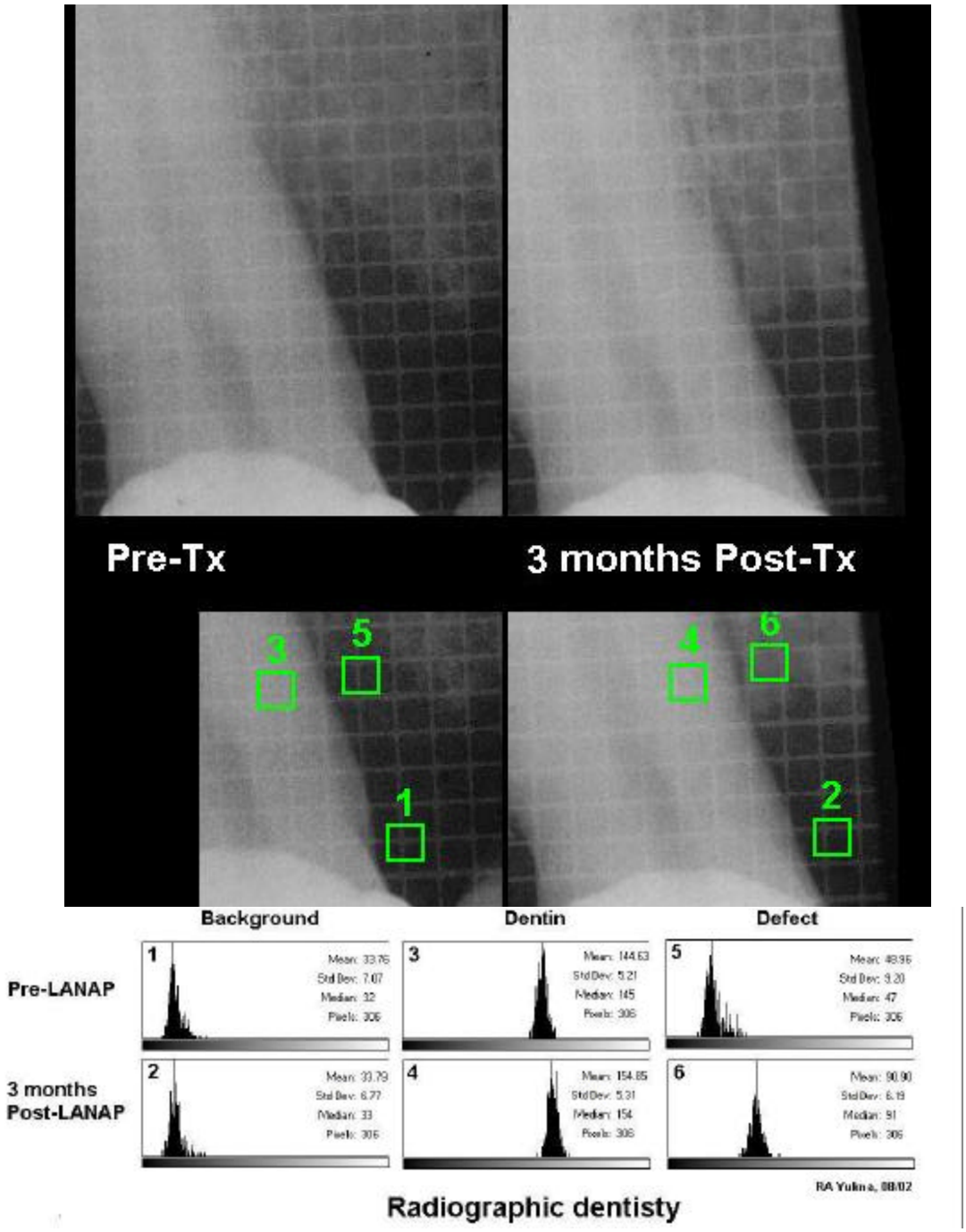

Figure 3. Normalized radiographic density is computed as the ratio of mean densities within the numbered windows as indicated.

For the Pre-Tx condition: Defect-Background (5-1) / Dentin-BG (3-1) = 15/111 = 13.5.
At three months Post-Tx the density is (6-2)/(4-2) = 57/125 = 45.6.

For these images the normalized radiographic density relative to root dentin is 13.5% Pre-Tx and 45.6% Post-Tx, an increase in bone density within the defect of 32.1%.