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Case Report

CLINICAL EVALUATION OF HEALING OF PERIODONTAL TISSUES AFTER LASER ASSISTED NEW ATTACHMENT PROCEDURE (A NO CUT, NO SEW PROCEDURE): A CASE REPORT

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ABSTRACT

Periodontitis is treated by non-surgical, antimicrobial and surgical therapies. Recently, Lasers having bactericidal effect have proved one of the promising new modality for treatment of periodontitis. Laser Assisted New Attachment procedure is minimally invasive surgical therapy, wherein laser is used for removal of diseased epithelium to induce new attachment without any side effects on the host tissue.

This study was planned to evaluate clinical effects of LANAP during the early healing period of three weeks on the periodontal tissues. Results of this study would be crucial in the establishment of LANAP as the treatment of choice for Chronic Moderate Periodontitis.

INTRODUCTION

Periodontitis is relatively a common disease . Various therapies have been recommended for its treatment which includes non surgical, anti microbial and surgical therapy. In recent years lasers have been used for all these three purposes. Lasers have bactericidal effect that helps to reduce inflammation in periodontal pocket in addition to scaling (Andreas Moritz *et al*, 1998). The focus of periodontal surgical procedures has shifted over the past three decades from a philosophy based on resection (subtractive) to one of regeneration of lost tissues (additive) (Khadtare Y, 2014). When a patient presents with severe attachment loss, regeneration cannot take place until the etiologic factors have been effectively managed or reversed and the disease progression is arrested. Traditional surgical techniques have been successful in facilitating access and addressing the goal of "pocket elimination" . However, such surgical methods often result in unpleasant side effects, which can be painfull and disfiguring (Khadtare Y, 2014).

Laser therapy remains controversial in the field of periodontics (Cobb *et al*, 2010; Schwartz F *et al*,2009; Rader *et al*, 1996) (Gold *et al*, 1994; Neil *et al*, 1997; Aoki *et al*,1994; Niemz *et al*, 2007). Lasers of varying wavelengths (635 to 10,600nm) used for nonsurgical and surgical periodontal and peri-implant therapy include: diode, neodymium: yttrium - aluminium – garnet (Nd:YAG), Carbon dioxide, Erbium : yttrium - aluminium–garnet (Er:YAG) (Gold *et al*,1994; Neil *et al*,1997; Aoki *et al*,1994; Niemz *et al*, 2007). Periodontal therapy utilizing a laser has been reported as a monotherapy, as an adjunct to scaling and root planning, for root debridement combined with surgical or non-surgical therapy (Dilsiz A *et al*, 2010; Gregg *et al*, 1998) and to perform surgical laser assisted new attachment procedure (LANAP) (Gregg *et al* 1998; Garrett S, 1996). Minimally invasive laser periodontal therapy utilizing the patented LANAP protocol has been advocated for periodontal treatment but has limited clinical research demonstrating its efficacy and predictability (Khadtare Y, 2014).

The concept of LANAP was born back in 1989 with Drs. Robert GreggII and Del McCarthy (David Kimmel, 2011). Gregg and McCarthy published research on the use of a specific free running pulsed neodymium : yttrium – aluminum – garnet (Nd:YAG) laser for the treatment of periodontal disease (Gregg *et al* 2002; Yukna *et al*, 2004). In 1990 they developed a specific protocol, laser-assisted new attachment procedure (LANAP), with research-proven operating parameters. The formal definition developed for LANAP is

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"cementum-mediated new attachment to the root surface in the absence of a long junctional epithelium". LANAP is designed to remove diseased and necrotic tissue selectively from within the periodontal sulcus (Khadtare Y, 2014).

LANAP received Food and Drug Administration clearance in 2004 (Yukna *et al*, 2004) An Nd:YAG laser was developed that operates at a wavelength of 1,064 nm to deliver the therapeutic LANAP.

Here we present a case report where laser is used to evaluate clinical effects of LANAP during the early healing period of three weeks on the periodontal tissues. Instead of Nd:YAG laser we have used diode laser because diode laser have similar properties as the Nd: YAG laser that emits radiation within the infrared range at a very similar wavelength (Andreas Moritz *et al*,1998)

Case Report

A 49 year male patient reported to the Outpatient Department of Periodontology and Oral Implantology, Bharati Vidyapeeth Deemed University Dental College and Hospital Pune with chief complaint of bleeding gums since 5-6 months from his upper front teeth while brushing and chewing. Upon clinical examination it was noted that probing depth was 6-8mm with grade I mobility with respect to 13, 12, 22, 23 (figure 1). Radiographic examination revealed moderate to severe bone loss (figure 1). Patient was diagnosed suffering from generalized chronic moderate to advanced periodontitis. Right and left upper anterior teeth were treated with iLase LANAP protocol.

Procedure

LANAP protocol was carried out as follows:

- The operating site was anesthetized with 2% lignocaine containing 1:2,00,000 adrenaline. Bone sounding was done around each tooth to determine areas of osseous defects that cannot be seen radiographically.
- Laser was used for the first time with an objective to remove diseased epithelium, to affect selectively bacteria associated with periodontal disease, to affect calculus present and to affect thermo labile toxins. This is called troughing. Troughing around each tooth was done for 150msec at 20Hz 3Watts (figure 2).
- The bacteria that are associated with periodontal diseases are pigmented and are found in the sulcus, within the root surface and within the epithelial cells. One of the reasons for the predictability of this step is in the selection of a free-running pulsed Nd:YAG laser with a wavelength of 1,064 nm and pulsed in a range of seven different microseconds. The shorter 1,064 nm wavelength was selected for its affinity for melanin or dark pigmentation and increases the depth of penetration. The diode lasers are also known for this selective absorption in pigmented tissues.

Probing depths pre-operatively and radiographic appearance

Figure 1 Pre-operative probing depth and radiographic appearance

- Piezoscaler OR curettes was now used to remove the calculus present on the root surface. The removal of calculus is believed to be easier after interaction of laser energy with the calculus. The first interaction of laser resulted in the initial formation of mini flap further assisting in removal of calculus because of increased visibility and access to calculus.
- Now again the laser was used to enhance the ability to form a fibrin clot to close the mini flap and to disinfect the site again (figure 2). The role of fibrin clot is to keep the sulcus sealed against bacterial infilteration and to prevent the growth of epithelium down into sulcus. This was accomplished by using laser for 650msecs at 20Hz 3Watts (figure 2).
- The fibrin clot was now compressed to enhance the healing process. Because laser wound heals by secondary intention, closer approximation enhances the healing time.
- Occlusion was refined as it is considered a greater co-factor in progression of periodontal disease.
- Post-operative instructions were given and patient was recalled for routine questionare about pain, discomfort and bleeding for which he did not complain for any of these.

Application of laser in LANAP

Figure 2 Initial troughing, irrigation after use of piezoscaler, final application of laser

Patient was kept on recall every month for next 3 months. Only visual examination was done at first and second month post operatively. Oral hygiene was reinforced in patient.

RESULT AND DISCUSSION

At 3 month post-operatively clinical analysis was done. Gingival and periodontal condition improved without any clinically visible signs of inflammation. Color of gingiva changed from reddish pink to physiologic pink, consistency changed from soft and edematous to firm and resilient, bleeding on probing stopped. Probing depth reduced from 5-8mm to 3mm (figure 3). Mobility reduced completely.

Thorough root surface debridement is critical to successful treatment of periodontal disease. It is difficult to remove sub gingival plaque and calculus in pockets that are 5mm or deeper. A primary objective for surgical intervention is to provide access and visualization for scaling and Root planing of these deep pockets. Traditional incisional surgery (such as flap with osseous resection) results in reduced pocket depth due to apical repositioning of the gingival margin exposing the root surface to the oral cavity.

Scalpel surgery could result in possible attachment loss, gingival cratering and gingival recession. The pain and discomfort associated with periodontal surgery is well known. By comparison, laser periodontal surgery eliminates pockets with minimal recession or repositioning of the gingival margin. Laser troughing makes it possible to visualize and access the root surface by removing necrotic debris, releasing tissue tension, and controlling bleeding. It also defines tissue margins prior to ultrasonic and mechanical instrumentation, preserves the integrity of the mucosa, and aids in maintaining the free gingival crest. This technique allows for selective removal of sulcular or pocket epithelium while preserving connective fibrous tissues.

The hemostatic capability of intraoral laser surgery has been known and utilized for decades; to this end, the 1,064nm wavelengths and 635 µ/sec "long pulse" used in LANAP are designed specifically to maximize intraoperative hemostasis and aids in therapeutic fibrin clot formation as the last step of the procedure.

In the present case report we have used a diode laser. This laser does not interact with dental hard tissues therefore it is an excellent soft tissue laser. Kreisler *et al* assessed the periodontal ligament cell attachment to root surface treated with 810nm diode laser and concluded that the diode laser does not have any deleterious effect on the root surface.

Post operative view

Figure 3 Post operative probing

These findings indicate that the diode laser can be safely used in periodontal pocket in close proximity of hard tissues. Moritz *et al* reported pocket irradiation with diode laser (805nm) following scaling which produced considerable bacterial elimination from periodontal pockets especially in terms of Aggregatibacter actinomycetemcomitans.

CONCLUSION

LANAP is a well-defined treatment protocol, with human histologic validation and evidence of initial and long-term success. As the LANAP multicentre clinical studies move to completion, it would be reasonable to expect to see LANAP become the conventional manner or the standard for the treatment of periodontal disease. It is a very simple but eloquent protocol, one in which the patient has no to minimal discomfort and treatment acceptance is high. Continued research and careful observation will be necessary to sustain the clinical findings.

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