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Laser-Assisted New Attachment Procedure – LANAP

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ABSTRACT

The LANAP process is a protocol that compacts with inflammation, the infectious procedure, occlusion, tooth mobility, and an osseous component. The LANAP protocol is rather simplistic. Utilized by a certified and trained periodontist or dentist, it is a surgical laser procedure intended for the treatment of periodontitis through regeneration rather than resection. The definitive objective is to set up the periodontal condition to advance self-regeneration of the lost attachment and osseous structure that result from periodontal ailment. Regeneration is a fairly complex event and, as observed with guided tissue regeneration or scaling and root planning alone, can be very unpredictable. LANAP is predictable. This article introduces a general depiction of the LANAP protocol (laser-assisted new attachment procedure) and the advantages of its utilization to patients.

Keywords: LANAP, Periodontal Attachment Loss, Nd-YAG Lasers, Periodontal Pocket, Periodontal Regeneration.

INTRODUCTION

There is a need among patients and clinicians to treat periodontal ailment adequately with minimally invasive treatments [1]. Recent journals have concentrated on surgical treatment with minimally intrusive flap approaches [2]. Many patients and clinicians decline to utilize these successful regular surgical strategies because of apparent and genuine side effects, for example, as root exposure, gingival recession, and postoperative distress. This frequently prompts the determination of nonsurgical treatments for treatment of advanced periodontal ailments, bringing about deficient determination of the ailments [3]. Laser-Assisted New Attachment Procedure (LANAP) therapy, having been at first presented over 16 years ago, is winding up more generally acknowledged among clinicians as extra research emerges [4]. An underlying histologic report gave confirmation of new connection to LANAP-treated teeth with new cementum and inserting Sharpey's fibers [5]. This was affirmed by a current report documenting human evidence of standard for periodontal regeneration with new cementum, periodontal ligament, and alveolar bone adjacent to previously diseased root surfaces. Notwithstanding histologic documentation, it is important to comprehend the clinical reaction to treatment [6]. Laser treatment stays dubious in the field of periodontics [7]. Lasers of fluctuating wavelengths (635 to 10,600nm) utilized for nonsurgical and surgical periodontal and peri- implant treatment include: diode, neodymium: yttrium-aluminum-garnet (Nd:YAG), carbon dioxide, Erbium: yttrium-aluminium– garnet (Er:YAG) [8, 9]. It is significant to note that lasers of changing wavelengths have diverse levels of tissue infiltration relying upon reflection, scatter and retention [10]. Along these lines, every treatment must be separately explored with a particular laser. Every laser can't be expected to imitate outcomes of a laser of an alternate wavelength notwithstanding when used to implement a comparable treatment. Periodontal treatment using 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 treatment [11], and to perform surgical laser – assisted new attachment procedure 'LANAP` [12].

The essential objective of periodontal therapy is to set up periodontal health with pocket lessening and connection attachment gain, ideally through periodontal regeneration. Periodontal regeneration defined as building up a new attachment apparatus on a formerly diseased root surface through new cementum, new periodontal ligament (PDL), and new bone [13]. Numerous regenerative treatments have shown sufficient documentation of new periodontal structures regenerated adjacent to a calculus notch to meet these criteria [14, 15]. All these treatments use surgical bone replacement graft material (autogenous , allogenic or xenogenic) or a biologic agent (growth factor or amelogenins) with or without the arrangement of barrier membrane . A large portion of these reports incorporate the utilization of periodontal surgical flap processes [16].

The search for the holy grail of periodontal regeneration remains. Nevertheless all of progresses referenced above, predictable regeneration of periodontal tissues remains to be an enigma within a conundrum. Puzzling, incongruous, and debateable as a consequence of an incomplete understanding of its mechanism, it remains a lightning rod of on-going dispute. For more than a generation, dentists have utilized lasers for a variation of applications in clinical dental practice. Gregg and McCarthy introduced research on the use of a specific free - running pulsed neodymium: yttrium– aluminium – garnet (Nd:YAG) laser for the management of

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periodontal infection. First comprehended and developed in the 1990s, they later offered its use for achieving bone regeneration [17, 18]. They established a detailed protocol, laser-assisted new attachment procedure (LANAP), with research-proven operating parameters. LANAP received Food and Drug Administration clearance in 2004 [19]. An Nd:YAG laser was established to operates at a wavelength of 1,064 nm to deliver the therapeutic LANAP. The formal definition developed for LANAP is cementum-mediated new attachment to the root surface in the absence of a long junctional epithelium. Patterned after the Excisional New Attachment Procedure (ENAP), LANAP is planned to remove diseased and necrotic tissue selectively from within the periodontal sulcus. Nevertheless, the LANAP uses a free-running (10 - 6 seconds) pulsed Nd:YAG laser in place of a scalpel. Initially referred to as Laser-ENAP, LANAP has developed to provide a minimally invasive alternative to flap surgeries.

The potential for regeneration is expedited by:

- Delivering forceful, exact, and selective energy to the affected area (periodontal pocket), without harm to adjacent tissues.
- Being bactericidal to pigmented periodontal pathogens.
- Sealing the pocket orifice with a thermal fibrin clot.
- Generating a physical barrier, for example, a barrier membrane, avoiding down growth of epithelium.
- Promoting healing from the bottom up instead of the top down by stimulating the release of pluripotential cells from the PDL and alveolar bone.

In spite of the initial argument surrounding characteristics of LANAP, the technique characterises an accurate treatment protocol, combining the best features of laser-mediated surgery with the well-established principles of traditional periodontal therapy. The objectives are the same, but the application of approaches for attaining these objectives is obviously different. In all cases, consistent with LANAP, aggressive debridement of all pockets/defects is accomplished with high-power piezo scalers.

On the other hand, despite that the objectives similar to each other, there are numerous considerable advantages credited to LANAP treatment when contrasted with ordinary periodontal surgery. The advantages have been depicted as less intrusive and less painful, insignificant postoperative distress, negligible subsidence and warm affectability, quicker healing, and similarly successful outcomes treating dental implants and natural teeth. The idea of LANAP was established back in 1989 by Robert Gregg and Del McCarthy. They were involved in the early utilization of Nd:YAG lasers in dentistry. Defied with patients not willing to lose teeth and declining traditional surgery or extraction, they advanced the LANAP protocol. In one of the greatest human histology studies, Yukna et al. [20] were the first to distribute and demonstrate incontrovertibly the positive results of LANAP therapy treatment when contrasted with conventional periodontal treatment. The study was university based, longitudinal, controlled, prospective, and masked. The outcomes demonstrated unequivocally that 100% of the teeth treated with LANAP shaped new attachment as opposed to 0% of the control teeth.

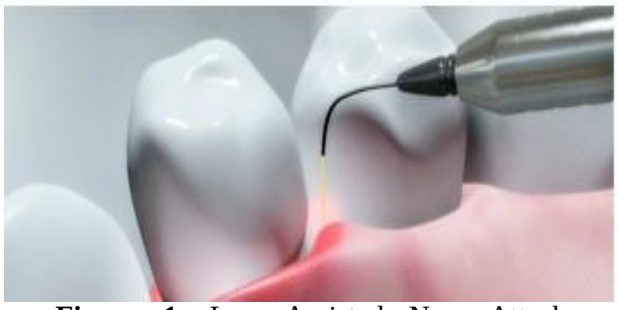

Figure 1. Laser-Assisted New Attachment Procedure – LANAP.

Periodontitis treatment with LANAP

LANAP is utilized to treat gingivitis and periodontitis by taking out the disease to gums and teeth by scaling off the bacterial plaque and tartar, by expelling just the tainted gum tissue and re-establishing healthy gum tissue, and by avoiding additional bleeding through clotting. Where harm is available in the calcified cementum, the gingival sulcus pockets (where gums meet teeth), the associating and gum tissue, the tooth chamber and root, and the periodontal ligament, LANAP can be utilized to evacuate tainted gum tissue, clean and sterilize sulcus and periodontal pockets, re-establish interfacing tissues and reconstruct the periodontal ligament fibres. Through recovery, LANAP treatment utilizes the healthy gum tissues and bone to retain as much of the unaffected oral structures as could be expected, and to revive the parts influenced by gum malady to healthy restoration with the goal that dental health of a patient as well as their general health is rationed and ensured [21].

Periodontitis is a destructive gum ailment that is induced by gingivitis. At the point when plaque develops around the teeth and gums, it can cause irritation of the gum tissue and bleeding. This is identified as gingivitis. On the off chance that left untreated and if microscopic organisms grabs hold causing more microorganisms contaminated plaque and tartar develop, the whole tooth structure can decay, turn out to be loose and drop out. Destructive anaerobic microorganisms consume the bone, gum and cementum (connective tissue) for nutrition. The activity of this bacterial disease can cause gum tissue to end up strictly painful and bleed as of the

infected tartar calculus existing in the gum tissue and lower the gum line in the periodontal pockets and roots. As the gums and teeth rot with infectious disease, the concerning tissues and also the periodontal ligament fibres between the alveolar bone and cementum could be damaged. Individuals with gingivitis and periodontitis are not just in danger of tooth loss, misaligned teeth structure, and jaw or facial distortions, but on the other hand are in danger of having the contamination spread to the rest of their body causing hypertension, heart disease, and conditions like migraine.

The LANAP Protocol

Step A: Patients experience a full dental examination and treatment strategy as with all dentistry. In the event that they have a proper determination of Type III or more prominent periodontal illness, all treatment choices are introduced to the patient. The primary step of the LANAP procedure, after anesthesia has been managed, is bone around every tooth. The goal is to decide regions of osseous deformities that can't be seen radiographically.

Step B: The first run through the laser is utilized. The goal of this step is to evacuate just contaminated epithelium, to influence specifically bacteria related with periodontal malady, to influence the calculus introduce, and to influence thermo labile poisons. The bacteria that are related with periodontal illnesses are pigmented and are found in the sulcus, inside the root surface and inside the epithelial cells. One reason for the consistency of this progression is in the determination of a free-running beat Nd:YAG laser with a wavelength of 1,064 nm and beat in a scope of seven unique microseconds. The shorter 1,064 nm wavelength was chosen for its partiality for melanin or dark pigmentation, not at all like the more extended wavelengths that are very absorbed in water and would have a shallow profundity of penetration. This capacity to expand the depth of penetration of the laser energy with insignificant collateral damage is the reason that the sick epithelium can be specifically evacuated without harm to the hidden tissue, leaving in place rete pegs. The diode lasers are likewise known for this particular ingestion in pigmented tissues, however the free running, beat Nd:YAG lasers contrast in their capacity to work at high pinnacle controls in brief time frames, which permits the Nd:YAG to have the more prominent penetration and the lack of collateral damage. **Step C**: This progression in the LANAP procedure is direct; it is simply an issue of utilizing the piezo-scalers to evacuate the calculus present on the root surfaces. The expulsion of calculus is accepted to be easier after the connection of the laser energy with the calculus. The main collaboration of the laser brings about the underlying development of a mini-flap, which aiding the expulsion of calculus as a result of expanded visibility and access to the calculus.

Step D: The subsequent step once more utilizes the laser. This time the parameters are diverse to improve the capacity to shape a fibrin clot to close the mini-flap and to purify the site once more. The construction of the stable fibrin clot is important, as it is steady for roughly 14 days. The part of the fibrin clot is to keep the sulcus sealed against bacterial penetration and to avoid the development of epithelium down into the sulcus. Further laser wavelengths not just do not have the capacity to shape this stable fibrin clot, yet additionally require frequent treatments to avoid epithelium development down into the sulcus. The capacity to select the laser–tissue interaction explicitly is distinctive to the PerioLase MVP-7(Millennium Dental Technologies). Using particular fiber sizes, energy, repetition rates, pulse intervals and standardization of the energy at the fiber tip; this procedure may be followed in an anticipated and reproducible way. The high standard of training that each LANAP doctor gets additionally adds to the consistency of this procedure and to its care. Individuals give distinctive tissue sorts alongside various degrees of ailment. One of the reasons for the hands-on training is learning to distinguish these differences and how to change the laser parameters accordingly so that the preferred laser–tissue interactions are achieved (Figure 2).

Step E: The fifth step in LANAP is the compression of the fibrin clot to improve the healing process. Because laser wounds heal by secondary intention, closer approximation enhances the healing time.

Step F: Following the pressure and stabilization of the clot, the last step of LANAP is refining the occlusion with a dental drill or diamond bur. Occlusion has been viewed as a more prominent cofactor in the progress of periodontal ailment than smoking. With a specific end goal to limit this part, broad adjustments are made to the dentition.

Step G: The last step of LANAP is bone regeneration and cognitive tissue re-attachment, the patients are then monitored for 9 to 12 months with routine supra-gingival cleanings and occlusal refinements. No sub gingival restorative or periodontal probing is done throughout this time. Only amid the final postoperative visit is a periodontal probing done. The hallmark of LANAP is pocket reduction, new tissue attachment and a lack of tissue recession (Figure 2).

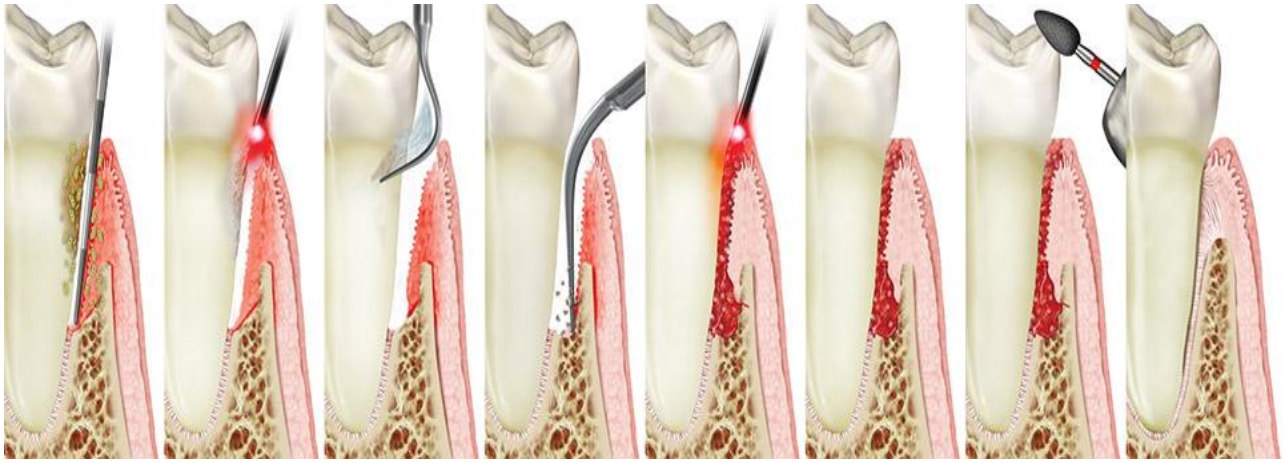

Figure 2. Laser-Assisted New Attachment Procedure – LANAP protocol.

Benefits and hazards of LANAP treatment

The benefits of LANAP treatment far outweigh the hazards of not seeking treatment due to fear of surgery. These benefits include:

- conservation of gum tissue and bone that may be lost in traditional gum surgery
- protection against bone loss or developing sensitive teeth and receding gums
- creation of a healthier condition for the body to regenerate and heal itself
- relief from inflammation and infection causing painful teeth and gums
- pain-free treatment with local anaesthetic
- safe treatment for patients with conditions like haemophilia, HIV and diabetes, or on medications such as cyclosporine
- minimal discomfort after the procedure with quicker recovery
- treatment duration of two days with follow-up to check how the mouth is healing

The hazards allied with LANAP treatment are similar to any hazards allied with laser use in dentistry, for example, ensuring the dentist is trained to use the technology for the specific procedure according to health and safety guidelines, that the equipment is preserved and in proper working condition, and that the laser is not used for procedures that require other treatment options.

LANAP training

The LANAP Training Continuum is a yearlong, thorough, live-persistent, hands-on preparing program that dental specialists experience to guarantee that they are protected and viable in the LANAP method. The initial three days of preparing, Laser Boot Camp™, concentrates on wellbeing and viability in the LANAP protocol. Upon culmination, dental specialists are conceded a restrictive permit to utilize the LANAP convention and have been granted a Standard Proficiency Certificate. Advancement 4 of the Training Continuum is intended to happen following a half year of clinical LANAP practice and experience. Amid Evolution 4, the new LANAP "start" will come back to acquire experiences for effective, safe, and ideal LANAP convention procedures, system, and laser working parameters, and acknowledge enhanced LANAP results and more noteworthy clinician and operatory efficiencies. Endless supply of Evolution 4, dental specialists get an Expanded Proficiency Certificate. Evolution 5 of the LANAP Training Continuum is a vital piece of the built up Continuum of LANAP preparing that, up on successful completion, prompts a testament in "LANAP Proficiency" and chooses the LANAP-capable clinician as kindred in the Institute for Advanced Laser Dentistry. Development 5 concentrates on expanding vitality thickness for considerably more noteworthy LANAP execution, flexibility, adjustments, and expanded abilities, and also enhanced clinical results and administration strategies for clinically troublesome LANAP case sorts. Endless supply of Evolution 5 may the specialist utilize quartz fiber optics in various distances across, for example, the 300-and 400-micron filaments that have been exceptionally produced with the capacity to bend in the outrageous twist range that LANAP regularly requires. Dental practitioners who finish Evolution 5 have accomplished one of the largest amounts of clinical, live patient, hands-on preparing in cutting edge laser dentistry accessible today [5, 23].

CONCLUSION

LANAP very much characterized treatment protocol, with human histologic approval and

confirmation of initial and long-term success. As the LANAP multicentre clinical studies move to completion, it would be rational to assume to see LANAP become the conventional method or the standard for the management of periodontal ailment. It is a very simple but expressive 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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