

Non-Surgical Periodontal Therapy: A Review

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Abstract: Periodontal diseases are biofilm-mediated, chronic infectious diseases and are the most common cause of tooth loss in the modern world. Periodontitis involves a complex interaction between environmental (such as specific bacteria) and host (genetic and immunological) factors that leads to loss of periodontal attachment apparatus. Nonsurgical periodontal therapy (NSPT) is the cornerstone of periodontal therapy and the first recommended approach to the control of periodontal infections. Nonsurgical therapy aims to eliminate both living bacteria in the microbial biofilm and calcified biofilm microorganisms from the tooth surface and adjacent soft tissues. Complete elimination of such pathogenic microorganisms is perhaps over-ambitious. However, a reduction in inflammation of the periodontium due to a lesser bacterial load leads to beneficial clinical changes. The aim of present review of literature is discuss the nonsurgical periodontal therapy in detail.

Keywords: Periodontal infection, Non-surgical periodontal therapy, NSPT

Introduction: Periodontitis is an infection of Periodontium. Whereas, the word ‘Perio’ means gingiva and other tissues surrounding teeth, ‘dont’ mean tooth and ‘itis’ means inflammation, So the whole term “Periodontitis” indicates chronic inflammation of gingiva periodontal ligaments, alveolar bone and dental cementum.¹ According to World Health Organization (WHO) it is widely spreadable chronic disease around the world. It begins with accumulation of plaque around teeth which form microbial biofilms with bacteria followed

by localized inflammation of gingiva. Negligence of this situation causes chronic condition of periodontal disease.²

Periodontitis is an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both.³ Ideally, periodontal therapy should eliminate inflammation, arrest progression of periodontal disease, improve esthetics, and create an environment conducive to maintenance of health.⁴

Nonsurgical periodontal therapy (NSPT) is the cornerstone of periodontal therapy and the first recommended approach to the control of periodontal infections. It is also known as “Cause-related therapy,” “Phase I therapy or Etiotrophic phase,” and “Initial therapy.” It is defined as “plaque removal, plaque control, supragingival and subgingival scaling root planing (SRP), and adjunctive use of chemical agents.” Although NSPT has evolved over the years, it is still considered to be the “gold standard” to which other treatment methods are compared.⁵ The aim of present review of literature is discuss the nonsurgical periodontal therapy in detail.

Various Non-Surgical Periodontal Therapy

Scaling and Root Planing: The primary goal of nonsurgical periodontal therapy is to control microbial periodontal infection by removing bacterial biofilm, calculus, and toxins from periodontally involved root surfaces.

Scaling and root planing, also known as conventional periodontal therapy, non-surgical periodontal therapy or deep cleaning, is a procedure involving removal of dental plaque and calculus (scaling or debridement) and then smoothing, or planing, of the (exposed) surfaces of the roots, removing cementum or dentine that is impregnated with calculus, toxins, or microorganisms,⁶ the etiologic agents that cause inflammation. It is a part of non-surgical periodontal therapy. This helps to establish a periodontium that is in remission of periodontal disease. Periodontal scalers and periodontal curettes are some of the tools are involved in this procedure.⁷

Scaling and root planing procedure is to be considered effective if the patient is subsequently able to maintain their periodontal health without further bone or attachment loss and if it prevents recurrent infection with periodontal pathogens.⁸

The long term effectiveness of scaling and root planing depends upon a number of factors. These factors include patient compliance, disease progress at the time of intervention, probing depth, and anatomical factors like grooves in the roots of teeth, concavities, and furcation involvement which may limit visibility of underlying deep calculus and debris.⁸

Chemotherapeutic Agents: The use of chemical agents with antiplaque or anti-gingivitis action as adjuncts to oral hygiene seems to be of limited value, because mouth rinses do not penetrate appreciably into the gingival crevice, but they show specific benefits when used as adjuncts to control gingival inflammation, especially in acute situations, postsurgically, and during periods of interrupted hygiene. Many chemotherapeutic agents are now available treating periodontal diseases. Four generations of antiseptics that includes:⁹

- **I Generation:** Antibiotics, phenols, quaternary ammonium compounds, and sanguinarine
- **II Generation:** Bisbiguanides, bipyridines, quaternary ammonium compounds, phenolic compounds, metal ions, halogens, enzymes, surfactants, oxygenating agents, natural products, urea, amino alcohols, saliflour, and agents that increases the redox potentials
- **III Generation:** Effective against specific periodontogenic organisms
- **IV Generation:** Probiotics are incorporated in mouthwashes.

Antibiotics in Periodontics: A microbiological approach to periodontal therapy aims primarily at suppressing specific pathogenic bacteria and permitting subsequent recolonisation of microbiota compatible with health. Studies conducted, revealed antimicrobial agents to be helpful as adjuncts in treating periodontal disease, hence investigators sought different methods to deliver these antimicrobials to periodontal pockets. The various methods employed, have included rinsing, irrigation, systemic administration and local application using sustained and controlled delivery devices.¹⁰

- **Systemic Antibiotic Therapy:** Systemic periodontal antimicrobial therapy is based on the premise that specific microorganisms cause destructive periodontal disease and

that the antimicrobial agent in the periodontal pocket can exceed the concentration necessary to kill the pathogens. The systemic antimicrobial agents enter periodontal pockets following their intestinal absorption and passage from the blood stream into oral tissues, gingival crevicular fluid and saliva.^{11,12} Most commonly used antibiotics for periodontal organisms are metronidazole, amoxicillin, tetracycline, clindamycin, azithromycin, ciprofloxacin, and augmentin.

- **Local Antibiotic Therapy:** Local antibiotic therapy involves the direct placement of an antimicrobial agent into sub gingival sites, minimizing the impact of the agent on non oral body sites. The various local delivery antimicrobials available are: Tetracycline – non resorbable fibres, Metronidazole gel, Minocycline ointment, Doxycycline hyclate in a resorbable polymer, Resorbable tetracycline in fibrillar collagen, Minocycline microspheres, Azithromycin gel.^{11,12}

Indication of Local Antibiotic Therapy¹⁴

- Periodontal patients with successful phase 1 periodontal therapy.
- Medically compromised patients with Periodontitis where surgical therapy is contraindicated.
- As an adjunct to mechanical debridement or as sole therapy.
- Patients having recurrent or refractory periodontitis.
- During periodontal regenerative procedures

Contraindication of Local Antibiotic Therapy¹⁴

- Periodontal patients with hypersensitivity reaction to any of the antimicrobials agents.
- Local delivery of metronidazole preparations, contraindicated in alcoholics.
- Irrigation devices are contraindicated in patients susceptible to infective endocarditis to avoid the risk of bacteremia.
- Antimicrobial agents through ultrasonic scalers are contraindicated in patients with cardiac pacemakers, asthmatics and infective conditions (AIDS, TB etc.).

Advantage of Local Antibiotic Therapy:¹³

- Relatively small amounts of the drug can produce a high concentration in the periodontal pocket.
- Minimal side effects
- Less potential of inducing resistant bacterial strains in other parts of the body.
- Controlled release devices can maintain a high concentration of the drug for an extended period.
- Reduces potential problems with patient compliance.
- May employ antimicrobial agents not suitable for systemic administration, such as various broad spectrum antiseptic solutions.

Disadvantage of Local Antibiotic Therapy¹³

- Difficulty in placing therapeutic concentrations of the antimicrobial agent into deeper parts of periodontal pockets and furcation lesions.
- Time consuming, if many periodontal sites are to be treated.

Host modulation therapy: Host modulation therapy (HMT) does not change the normal defence mechanism or inflammation, instead, they alleviate excessive or pathologically increased inflammatory processes to amplify the opportunities for wound healing and periodontal stability. Thus it helps in modulating host responses by down regulating the destructive aspects or up regulating the protective aspects of the host response. HMT includes systemically or locally delivered pharmaceuticals that are used as adjuncts to other forms of periodontal treatment.⁹

There are three categories of host-modulating agents in the periodontal therapy:

- Antiproteinases (represented by tetracyclines)
- Anti-inflammatory drugs and
- Bone-sparing drugs (bisphosphonates)

Laser in Nonsurgical Periodontal Therapy: Laser therapy in dentistry is an innovative potential molecular pathway mediating the nexus between inflammation and wound healing in oral tissues. Amongst recent advances, low-level laser therapy (LLLT) is highly recommended for its pain reducing, wound healing promoter and anti-inflammatory effects. Laser irradiation has been reported to exhibit bactericidal, and detoxification effects without

producing a smear layer and root surface treated with laser may, therefore, provide favourable conditions for the attachment of periodontal tissue.¹⁵

Ribeiro IW et al. in 2008 evaluated the auxiliary effect of the low-intensity laser in subgingival scaling and root planing by analysis of its clinical aspects, as well as its analgesic potential during the procedure. There was a reduction in gingival inflammation, yet without a statistically significant difference between the study and control sides, both in clinical aspects and evaluation of pain during the procedure.¹⁶

Miyazaki et al. (2003) reported decreased inflammation and PD after treatment with CO₂ laser and improvements regarding clinical parameters and subgingival microflora after Nd:YAG, CO₂ and ultrasonic treatments.¹⁷

Ozone in Non-surgical Periodontal Therapy: Periodontal diseases are caused by multiple factors but the most virulent factor is microbiota in periodontium. It was Thanomsub et al. 2002 who used ozonated water for mouth irrigation on cell growth and ultra structure of certain periodontal pathogens.¹⁸ In 2004 Nagayoshi et al. found the efficacy of ozonated water permeability and survival of oral micobiota i.e. gram negative bacteria, such Porphyromonas gingivalis and as Porphyromonas endodontalis more susceptible than gram positive bacteria.¹⁹ Huth., et al. in 2006, in research postulated that aqueous form of ozone is a potent antiseptic. Muller P. (2007) found there was no significant reduction in use of ozone + Scaling and root planing in chronic periodontitis patients with gasiform ozone. There was no change in Actinomyces naeslundii, Streptococcus sobrinus, Streptococcus oralis and Ibcans Veillonella dispar, Fusobacterium nucleatum population. Ozone application for treatment of periodontitis is one of newer approach that has been proved to be cost effective, predictable and user friendly with non – invasiveness.²⁰

Hyperbaric Oxygen Therapy in Non-surgical Periodontal Therapy: Hyper “is simply an increase,” while “baric” refers to the pressure. As a procedure or therapy, hyperbaric is simply the process of increasing the atmospheric pressure around the body. HBO therapy (HBOT) has been described as “a therapy in search of diseases.” The pressure is usually about 2-4 absolute atmospheres or ATA; it is essentially the therapeutic use of oxygen as a drug. When oxygen is used as a drug, the dose is controlled by the technology of a HBO₂ chamber, which sets the dosage at 100% oxygen.²¹

HBOT should be used to compliment conventional therapies and treatments. Guo and Zhu showed that HBOT combined with supragingival and subgingival scaling therapy had synergistic action on periodontitis.²² Hyperbaric oxygen therapy can be used as an adjunct to SRP to treat moderate-to-severe periodontitis. It has been shown to decrease load of anaerobic microbes and thus significantly improve periodontal health.²¹

Conclusion: Nonsurgical therapy aims to eliminate both living bacteria in the microbial biofilm and calcified biofilm microorganisms from the tooth surface and adjacent soft tissues. Nonsurgical periodontal therapy acts as the primary therapeutic measure in treating periodontal disease and also acts as the maintenance measure after surgical therapy. Thus nonsurgical periodontal therapy plays a major role in management of periodontal diseases.

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