

CURRENT TENDENCIES IN NON-SURGICAL PERIODONTAL TREATMENT. LITERATURE REVIEW

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Key words:
gingivitis, periodontitis,
periodontal disease,
antibacterial agents,
nonsurgical periodontal
therapy.

The aim of the work – to analyze modern approaches to non-surgical therapy of generalized periodontitis.

Conclusions. Dental practitioners and patients have preferred nonsurgical methods as the primary course of treatment for periodontal disease. The initial and most crucial step in managing periodontal disease is to ensure the patient's motivation.

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**СУЧАСНІ ТЕНДЕНЦІЇ НЕХІРУРГІЧНОГО ЛІКУВАННЯ ЗАХВОРЮВАНЬ
ТКАНИН ПАРОДОНТУ. ОГЛЯД ЛІТЕРАТУРИ**

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Мета роботи – проаналізувати сучасні підходи до нехірургічного лікування генералізованого пародонтиту.

Висновки. Лікарі-стоматологи та пацієнти віддають перевагу нехірургічним методам як основному курсу лікування пародонтозу. Початковий і найважливіший крок у лікуванні пародонтозу – це забезпечення мотивації пацієнта.

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Introduction

Periodontitis represents a significant public health problem since this highly prevalent chronic disease negatively affects oral and systemic health; it hurts oral-health-related quality of life (OHRQoL) by causing impaired function and esthetics while representing a second leading cause of tooth loss in adults, collectively increasing health care costs [1, 2, 3, 4].

Periodontitis is a chronic multifactorial inflammatory disease triggered by dysbiotic biofilms and characterised by periodontal tissue destruction, clinically manifesting as clinical attachment loss (CAL), the presence of periodontal pocketing, gingival bleeding, and radiological signs of alveolar bone loss [3, 5, 6].

According to data from the World Health Organization report, gingival bleeding and calculus, which primarily reflects poor oral hygiene, are most prevalent in adults worldwide. At the same time, advanced disease with deep periodontal pockets (≥ 6 mm) affects approximately 10 % to 15 % of the adult population [7, 8, 9].

The primary clinical features of generalised periodontitis include the loss of periodontal tissue support, typically identified by bleeding on probing, deepened probing depth, loss of attachment, gingival recession, halitosis, and tooth mobility [10, 11]. The main task of periodontal therapy is to reduce the number of harmful bacteria in the mouth. This

helps to prevent the onset or recurrence of inflammation and disease. Recent research highlights the connection between periodontal health and overall health, emphasizing the importance of maintaining good oral hygiene [12].

The aim of the work

To analyze modern approaches to non-surgical therapy of generalized periodontitis.

Main part

Periodontal therapy comprises a broad range of interventions applied stepwise to control the infection and arrest the inflammation. It consists of patient motivation, oral hygiene instructions, mechanical removal of supra and subgingival plaque and calculus deposits, correction of plaque-retentive factors, and risk factor modification. Nonsurgical and surgical periodontal therapies have been, for several decades, and remain the basis of periodontal treatment concepts [13, 14].

Nonsurgical periodontal therapy (NSPT) remains the gold standard for managing chronic periodontitis. Nonsurgical periodontal treatment focuses on eliminating bacterial plaque on the root surface using scaling and root surface debridement and preparing the root surface for healing. NSPT has been shown to provide improvement in clinical parameters, namely, Visible Plaque Index (VPI),

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Gingival Bleeding Index (GBI), Probing Pocket Depth (PPD), Clinical Attachment Level (CAL), as well as reduction of inflammation and periodontal pathogens [15].

Nevertheless, mechanical debridement may not eradicate all subgingival perio-pathogens, and adjunctive nonsurgical measures are sometimes used to eliminate bacterial biofilm and deposits and restore a balanced microbiota environment for periodontal health [16].

Aims of nonsurgical treatment

The overall aim of nonsurgical treatment is to create an environment biologically compatible with the healing of the periodontal tissues. This is mainly achieved by:

- Decontamination by removal of endotoxins from the root surface.
- Disruption and elimination of biofilm from the root surface.
- Removal of subgingival calculus from the root surface [17].

Benefits of the procedure include:

- Reducing the amount of bleeding when you clean your teeth.
- Firming up unstable teeth and stopping any further gum recession along the tooth.

- Helping retain your natural teeth. This is typically considered the best solution from a dental perspective because it prevents the need for replacement teeth, which can be time-consuming, painful, and costly.

Rationale for nonsurgical periodontal treatment

- Nonsurgical periodontal therapy eliminates the disease’s etiologic cause, bacterial plaque biofilm, and related variables.

- In most patients having periodontal disease, scaling and root planing reduce gingival inflammation, decrease probing depths, and improve clinical attachment.

- Although calculus formation is not a causative factor in periodontal disease, it is strongly associated with plaque biofilm. Effective removal of calculus has been shown to be significantly related to improved periodontal health. It is linked to plaque biofilm, and its removal is related to better periodontal health.

- Encourage tissue regeneration.
- Reduce the depth of probing.
- Increase the number of calories burned.
- Reduce bleeding.
- Take out the deposit [17].

NSPT has benefits and challenges (Fig. 1 and Fig. 2).

Benefits of effective NSPT

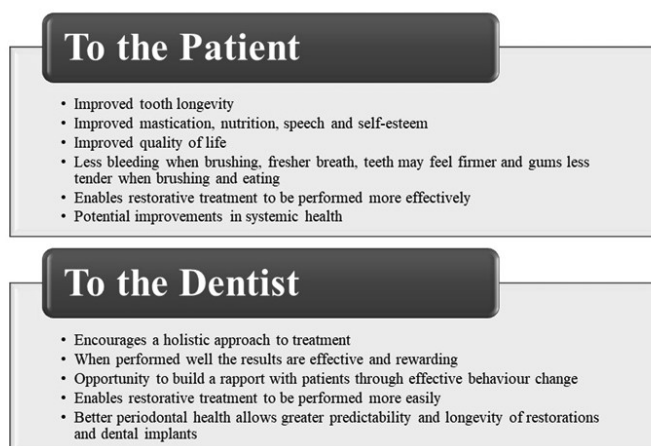


Fig. 1. Benefits of effective nonsurgical periodontal therapy.

Challenges associated with NSPT

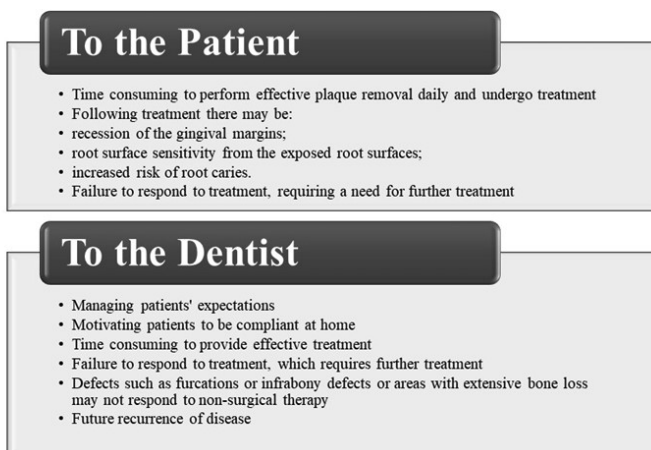


Fig. 2. Challenges associated with nonsurgical periodontal therapy.

NSPT includes mechanical and chemotherapeutic approaches to minimize or eliminate microbial plaque associated with the periodontal tissues, tooth surfaces

and other niches in the oral cavity and alter host immune-inflammatory response in the periodontal tissues [Bhansali]. Recently, alternative therapies have

been proposed to enhance the outcomes of traditional periodontal treatment. These therapies aim to reduce the bacterial count and reduce the expression of inflammatory mediators in the affected tissues. [19, 20, 21].

The patient's role in nonsurgical periodontal disease treatment

As well as the treatment provided at the clinic, the patient must understand that they play a crucial role in managing or curing their gum disease. One of the most critical aspects of periodontal therapy is the establishment of a meticulous home care regimen by the patient. Studies have shown that periodontal treatment in the absence of good home care will almost always fail.

The first responsibility is to eliminate factors that increase susceptibility to periodontal disease (smoking, diabetes and excessive use of alcohol). It is important to maintain daily plaque control; this is achieved through brushing and using other homecare aids.

Photodynamic therapy (PDT) and lasers use

Photodynamic therapy, as a localized, noninvasive therapeutic modality, was introduced in medicine in the early 1900s and is widely known for its success in treating neoplasms. PDT is a term coined by Von Tappeiner in 1904 to describe photosensitization-initiated oxygen-dependent chemical reactions.

The working mechanism of PDT involves the complex interactions among three different elements, namely photosensitizer (e.g. toluidine blue or methylene blue), low-intensity laser light (diode laser in most cases) and molecule oxygen [22].

Compared to other adjuncts, laser therapies are noninvasive, bio-stimulatory, and anti-infective methods to assist conventional treatment [23]. Several types of lasers have been used to treat periodontitis, such as diode laser (DL), erbium-doped yttrium, aluminum, and garnet (Er: YAG) lasers. Among these treatments, PDT is a unique strategy involving photosensitizer dye molecules excited by laser light of a specific wavelength [24].

The efficacy of PDT for the elimination of bacterial, fungal, and viral infections and critical pathogens such

as *Streptococcus mutans*, *Porphyromonas gingivalis*, *Candida albicans*, and *Enterococcus faecalis* has been investigated by many in-vitro and clinical studies.

Low-level Laser Therapy and PDT could be beneficial as complementary treatments for patients with periodontitis. They have anti-inflammatory properties that can help regulate the body's inflammation response [25].

Chemotherapeutic agents

The effects of mechanical therapy might be augmented using antimicrobial agents, which further suppress the remaining pathogens. Many chemotherapeutic agents are now available to treat periodontal diseases. Systemic anti-infective therapy (oral antibiotics) and local anti-infective therapy (placing anti-infective agents directly into the periodontal pocket) can reduce the bacterial challenge to the periodontium.

Four generations of antiseptics include:

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, salinour, and agents that increase the redox potentials;

III generation: Effective against specific peri-odontogenic organisms;

IV generation: Probiotics are incorporated in mouthwashes [26, 27].

Systemic antibiotic therapy

According to the latest guidelines for treating periodontitis (stage I to III), prescribing antibiotics for patient with generalised periodontitis is not recommended. The only exception is rapidly progressing periodontitis in young adults, in which amoxicillin (AMX) and metronidazole (MET) can be used either alone or as a combination (Table 1) [14]. Using AMX + MET simultaneously with SD results in statistically significant pocket closure, CAL gain, and BOP compared to SD alone. However, the long-term efficacy (>12 months) of this regimen on periodontal status has yet to be assessed [28, 29].

Table 1

Medicaments prescribed as general therapy for periodontal disease: intraoral intake

Ciprofloxacin and Metronidazol	250 mg 2 times a day of every medicament, duration 8 days
Ciprofloxacin and Tinidazol (Ciprolet A)	1 tab (ciprofloxacin 500 mg and tinidazol 600 mg) 2 times a day, duration 5-7 days
Amoxycilin and Metronidazol	250 mg 3 times a day of each component, duration 8 days

Local anti-infective therapy

Following scaling and root planning, antibiotics specifically targeted to the site of infection can be placed in the periodontal pocket to promote the healing of infected tissues. Site-specific antibiotics differ from those taken orally for systemic effects as they are placed directly in the infected area. These antibiotics are slowly released over time, seeping into the tissues and destroying bacteria living within the gingiva, providing further disinfection and facilitating healing. Some site-specific antibiotics also reduce pocket depth, providing an added benefit (ARESTIN (minocycline HCl), Ligosan Slow Release, LSR (Heraeus Kulzer, Germany), Tetracycline HCL (periodontal plus AB), ATRIDOX (doxycycline hyclate)®, ATRIGEL® Delivery System).

Topical antiseptic application

Topical application of antiseptics such as CHX, povidone-iodine, phenolic compounds and sodium hypochlorite, with anti-plaque or anti-gingivitis action, has been suggested as helpful oral hygiene aids to complement mechanical periodontal therapy. One of the options of topical antiseptic is PerioChip. It is a useful treatment for treating and maintaining periodontal disease. It is a biodegradable chip that contains 2.5 mg of chlorhexidine digluconate, which can help reduce pocket depth in adults with periodontitis. It has been clinically proven to be effective and well-tolerated for periodontal pockets with a depth of 5 mm or more. The chip releases the chlorhexidine slowly over seven days and can eliminate 99.9 % of bacteria in the pocket, and prevents the early recovery of the periodontal pathogenic biofilm for up to 11 weeks. The PerioChip is strong and can be easily inserted with forceps after routine

root surface debridement (RSD) due to its unique size and shape. Antiseptics can be used topically or subgingivally. Antiseptics in nonsurgical periodontal treatment may include pocket irrigation as well [8, 27, 30].

Supportive periodontal therapy (SPT)

Once a patient's periodontal condition has been improved with active periodontal therapy to a satisfactory standard as agreed by the patient and treating clinicians, an effective SPT program is essential in order to minimize the risk of relapse [31, 32].

A typical SPT appointment will consist of:

- Periodontal examination, including re-evaluation of PPD and CAL, plaque and BOP assessment.
- Update medical and social history, which helps to identify and address potential risk factors.
- Motivation and re-instruction of oral hygiene techniques.
- Supra and subgingival professional mechanical plaque removal (PMPR) to remove biofilm and calculus.
- Root surface debridement (RSD) in pockets ≥ 5 mm, especially those with BOP [33, 34].

Whilst NSPT is an integral part of stabilizing the disease, long-term supportive periodontal therapy (SPT) is crucial in helping to prevent or catch early future episodes of reactivity [11].

Conclusions

Periodontal disease has conventionally been treated non-surgically, which has been the preferred choice for both dental professionals and patients. The initial and most crucial step in managing periodontal disease involves motivating the patient to participate actively in the treatment plan.

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