International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Non-Surgical Periodontal Therapy: A Comprehensive Review

Dr. Sumit Kalia[1], Dr. Prairna Zaroo Kalia[2], Dr. Shobhana Misra[3], Dr. Vishnpriya TR[4], Dr. Dipasha Sharma[5], Dr. Mukul Dogra[6]

[1]Assistance Professor, Periodontics And Implantology, Dj Dental College And Research Institute
[2]Assistance Professor, Orthodontics And Dentofacial Orthopaedics, Dj Dental College And Research Institute
[3]Professor, Periodontics And Implantology, Dj Dental College And Research Institute
[4]Assistance Professor, Orthodontics And Dentofacial Orthopaedics, Bapuji Dental College And Hospital
[5]Postgraduate, Department Of Endodontics, Dj Dental College And Research Institute
[6]Postgraduate, Department Of Oral Surgery, Dj Dental College And Research Institute

Abstract
Non-surgical periodontal therapy (NSPT) remains the cornerstone of periodontal disease management, offering effective treatment for gingivitis and mild to moderate periodontitis while serving as the initial phase of therapy for severe cases. This review examines the fundamental principles, clinical techniques, adjunctive therapies, and evidence-based outcomes of NSPT. The primary objectives include elimination of subgingival biofilm, reduction of pocket depths, and establishment of a maintainable periodontal environment. Contemporary NSPT encompasses mechanical debridement through scaling and root planing, supplemented by patient education, antimicrobial agents, and host modulation strategies. Evidence demonstrates significant clinical improvements in probing depths, clinical attachment levels, and bleeding indices following NSPT. Success depends on multiple factors including disease severity, patient compliance, operator skill, and appropriate maintenance intervals. While NSPT effectively manages most periodontal conditions, understanding its limitations and indications for surgical intervention remains essential for optimal patient outcomes.

Keywords: Non-surgical periodontal therapy, scaling and root planing, periodontitis, dental prophylaxis, antimicrobial therapy, periodontal maintenance

1. Introduction

Periodontal disease represents a significant public health burden, affecting approximately 47% of adults over 30 years in the United States, with prevalence increasing with age (1). Non-surgical periodontal therapy (NSPT) constitutes the foundation of periodontal treatment, applicable across the entire disease spectrum from gingivitis to advanced periodontitis. The fundamental goal of NSPT is to control infection through mechanical disruption and removal of subgingival biofilm and calculus, thereby halting disease progression and establishing conditions conducive to periodontal health (2).

The rationale for NSPT is rooted in the microbial etiology of periodontal disease. Subgingival plaque biofilm harbors pathogenic bacteria that trigger inflammatory responses, leading to connective tissue

destruction and alveolar bone loss (3). By mechanically removing these bacterial deposits and creating smooth root surfaces resistant to plaque accumulation, NSPT addresses the primary etiologic factor. This review synthesizes current evidence regarding NSPT techniques, clinical outcomes, adjunctive therapies, and factors influencing treatment success.

2. Fundamental Principles and Objectives

The primary objectives of NSPT include: elimination of subgingival bacterial biofilm and calculus deposits, reduction of probing pocket depths, gain of clinical attachment, resolution of gingival inflammation, and establishment of a root surface environment compatible with periodontal health (4). Secondary objectives encompass patient education regarding proper oral hygiene techniques, modification of risk factors including smoking cessation, and establishment of appropriate supportive periodontal therapy intervals.

Success requires thorough disruption of the subgingival biofilm rather than merely achieving calculus removal. Research demonstrates that incomplete biofilm removal allows rapid bacterial recolonization, negating therapeutic benefits (5). Therefore, meticulous instrumentation technique and adequate treatment time allocation are essential for achieving optimal clinical outcomes.

3. Clinical Techniques

3.1 Scaling and Root Planing

Scaling and root planing (SRP) represents the definitive procedure in NSPT. Scaling involves removal of plaque, calculus, and stains from tooth surfaces, while root planing focuses on smoothing the root surface to remove embedded calculus and contaminated cementum (6). Contemporary understanding recognizes that aggressive cementum removal is unnecessary and potentially detrimental; the focus has shifted to biofilm disruption while preserving root structure (7).

Instrumentation may be accomplished using hand instruments, ultrasonic devices, or a combination approach. Hand instruments including curettes provide superior tactile sensitivity and are essential for certain anatomical areas, particularly furcations and line angles (8). Ultrasonic scalers offer advantages in efficiency, lavage effect, and reduced operator fatigue. The cavitational and acoustic streaming effects of ultrasonic instruments contribute additional antimicrobial benefits beyond mechanical debridement (9). Evidence suggests comparable clinical outcomes between hand and ultrasonic instrumentation when performed by skilled operators, with combination therapy often providing optimal results (10).

3.2 Full-Mouth versus Quadrant Therapy

Debate exists regarding optimal treatment sequencing. Traditional quadrant-based SRP performed over multiple appointments allows methodical treatment but extends the overall treatment period. Full-mouth disinfection protocols, involving complete debridement within 24 hours combined with antiseptic therapy, aim to prevent bacterial cross-contamination between treated and untreated sites (11). While some studies report superior outcomes with full-mouth approaches, systematic reviews demonstrate comparable long-term results between protocols, with patient preference and clinical circumstances guiding selection (12).

4. Clinical Outcomes and Efficacy

Extensive evidence supports NSPT efficacy in managing periodontal disease. Meta-analyses demonstrate mean probing depth reductions of 1.29 mm for shallow pockets (4-6 mm) and 2.16 mm for deep pockets (≥7 mm) following SRP (13). Clinical attachment level gains average 0.55 mm for initially shallow sites

and 1.19 mm for deep sites. Bleeding on probing typically reduces by 40-60%, indicating substantial inflammatory resolution (14).

Importantly, outcomes vary based on initial pocket depth, with deeper pockets showing greater absolute improvements but often residual depths requiring additional intervention. Studies indicate that approximately 75-90% of sites with initial depths of 4-6 mm respond favorably to NSPT alone, while only 45-60% of sites ≥7 mm achieve pocket closure to ≤4 mm (15). These findings emphasize the importance of realistic expectations and recognition of NSPT limitations in advanced disease.

5. Adjunctive Therapies

5.1 Antimicrobial Agents

Systemic and local antimicrobials may enhance NSPT outcomes in specific situations. Systemic antibiotics including amoxicillin-metronidazole combinations or azithromycin demonstrate additional pocket depth reduction of approximately 0.4 mm compared to SRP alone (16). However, routine antibiotic use is discouraged due to resistance concerns, with prescription reserved for aggressive periodontitis, refractory cases, or immunocompromised patients.

Local antimicrobial delivery systems including chlorhexidine chips, doxycycline gel, and minocycline microspheres provide sustained drug release to periodontal pockets. These agents offer modest additional benefits (0.3-0.5 mm pocket reduction) when used adjunctively with SRP, particularly beneficial for treating isolated residual pockets (17). Chlorhexidine oral rinses, while effective for supragingival plaque control, demonstrate limited subgingival penetration and marginal benefits as NSPT adjuncts (18).

5.2 Host Modulation Therapy

Subantimicrobial dose doxycycline (SDD, 20 mg twice daily) functions as a host modulating agent by inhibiting matrix metalloproteinases responsible for collagen breakdown. When combined with SRP, SDD demonstrates additional clinical attachment gains of approximately 0.4 mm and pocket depth reductions of 0.3 mm compared to SRP alone (19). This approach proves particularly valuable for patients with diabetes or refractory periodontitis, though cost-benefit considerations influence routine application.

6. Factors Influencing Treatment Success

Multiple factors influence NSPT outcomes. Disease severity significantly impacts results, with mild to moderate periodontitis responding more favorably than advanced disease (20). Initial pocket depth serves as a strong predictor, with shallow pockets achieving better resolution than deep pockets. Tooth-related factors including furcation involvement, complex root anatomy, and tooth mobility negatively affect outcomes.

Patient-related factors play crucial roles. Smoking significantly impairs healing, with smokers demonstrating 50% less clinical improvement compared to non-smokers (21). Diabetes mellitus, particularly when poorly controlled, compromises treatment outcomes through impaired immune function and wound healing. Patient compliance with oral hygiene instructions and maintenance appointments directly correlates with long-term success (22).

Operator skill and treatment thoroughness critically determine outcomes. Adequate time allocation, systematic approach, and proper instrumentation technique ensure comprehensive debridement. Studies demonstrate superior outcomes when adequate appointment duration allows meticulous treatment versus rushed procedures (23).

7. Supportive Periodontal Therapy

Long-term success requires regular supportive periodontal therapy (SPT), also termed periodontal maintenance. Without ongoing professional care, disease recurrence is common, with studies showing 30-40% of treated sites experiencing recurrent attachment loss within five years (24). SPT intervals typically range from three to four months, individualized based on disease severity, patient compliance, and risk factors. Maintenance visits include assessment of periodontal status, reinforcement of oral hygiene, and mechanical debridement of supragingival and accessible subgingival deposits.

8. Limitations and Indications for Surgical Therapy

While NSPT effectively manages most periodontal conditions, limitations exist. Deep pockets (≥7 mm), significant furcation involvements, and complex anatomical defects often respond inadequately to NSPT alone. Residual pockets ≥5 mm following NSPT present higher risks for disease progression and should be considered for surgical intervention (25). Additional surgical indications include need for pocket elimination, regenerative therapy for specific defects, or esthetic concerns including gingival recession or excessive gingival display.

The decision for surgical therapy follows comprehensive NSPT and adequate healing time (typically 6-8 weeks for reevaluation). This approach ensures that patients requiring surgery have optimized tissue conditions and demonstrated capacity for oral hygiene maintenance, factors critical for surgical success.

9. Conclusion

Non-surgical periodontal therapy remains the fundamental approach for managing periodontal disease, offering predictable outcomes for gingivitis and mild to moderate periodontitis while serving as essential initial therapy for all disease stages. Success depends on thorough mechanical debridement, patient education and compliance, modification of risk factors, and commitment to long-term supportive care. While adjunctive antimicrobial and host modulation therapies provide modest additional benefits in selected cases, mechanical biofilm disruption through SRP constitutes the therapeutic cornerstone.

Clinicians must recognize NSPT limitations and appropriately identify cases requiring surgical intervention. The integration of evidence-based NSPT techniques, individualized treatment planning, and comprehensive supportive care provides optimal outcomes for patients with periodontal disease. As understanding of periodontal pathogenesis advances, NSPT protocols will continue evolving, though the fundamental principles of infection control through mechanical debridement will remain central to effective periodontal care.

References

1. Eke PI, Dye BA, Wei L, Slade GD, Thornton-Evans GO, Borgnakke WS, et al. Update on prevalence of periodontitis in adults in the United States: NHANES 2009 to 2012. J Periodontol. 2015;86(5):611-22.
2. American Academy of Periodontology. Treatment of plaque-induced gingivitis, chronic periodontitis, and other clinical conditions. Pediatr Dent. 2005;27(7 Suppl):202-11.
3. Socransky SS, Haffajee AD. Periodontal microbial ecology. Periodontol 2000. 2005;38:135-87.
4. Cobb CM. Clinical significance of non-surgical periodontal therapy: an evidence-based perspective of scaling and root planing. J Clin Periodontol. 2002;29 Suppl 2:6-16.

5. Adriaens PA, Adriaens LM. Effects of nonsurgical periodontal therapy on hard and soft tissues. Periodontol 2000. 2004;36:121-45.
6. Drisko CL. Scaling and root planing without overinstrumentation: hand versus power-driven scalers. Curr Opin Periodontol. 1993;1:78-88.
7. Smart GJ, Wilson M, Davies EH, Kieser JB. Assessment of ultrasonic root surface debridement by determination of residual endotoxin levels. J Clin Periodontol. 1990;17(3):174-8.
8. Caffesse RG, Sweeney PL, Smith BA. Scaling and root planing with and without periodontal flap surgery. J Clin Periodontol. 1986;13(3):205-10.
9. Walmsley AD, Laird WR, Williams AR. Dental plaque removal by cavitational activity during ultrasonic scaling. J Clin Periodontol. 1988;15(9):539-43.
10. Tunkel J, Heinecke A, Flemmig TF. A systematic review of efficacy of machine-driven and manual subgingival debridement in the treatment of chronic periodontitis. J Clin Periodontol. 2002;29 Suppl 3:72-81.
11. Quirynen M, Bollen CM, Vandekerckhove BN, Dekeyser C, Papaioannou W, Eyssen H. Full- vs. partial-mouth disinfection in the treatment of periodontal infections: short-term clinical and microbiological observations. J Dent Res. 1995;74(8):1459-67.
12. Eberhard J, Jervøe-Storm PM, Needleman I, Worthington H, Jepsen S. Full-mouth treatment concepts for chronic periodontitis: a systematic review. J Clin Periodontol. 2008;35(7):591-604.
13. Heitz-Mayfield LJ, Trombelli L, Heitz F, Needleman I, Moles D. A systematic review of the effect of surgical debridement vs non-surgical debridement for the treatment of chronic periodontitis. J Clin Periodontol. 2002;29 Suppl 3:92-102.
14. Slots J. Selection of antimicrobial agents in periodontal therapy. J Periodontal Res. 2002;37(5):389-98.
15. Kaldahl WB, Kalkwarf KL, Patil KD, Molvar MP, Dyer JK. Long-term evaluation of periodontal therapy: I. Response to 4 therapeutic modalities. J Periodontol. 1996;67(2):93-102.
16. Herrera D, Sanz M, Jepsen S, Needleman I, Roldán S. A systematic review on the effect of systemic antimicrobials as an adjunct to scaling and root planing in periodontitis patients. J Clin Periodontol. 2002;29 Suppl 3:136-59.
17. Hanes PJ, Purvis JP. Local anti-infective therapy: pharmacological agents. A systematic review. Ann Periodontol. 2003;8(1):79-98.
18. Greenstein G, Berman C, Jaffin R. Chlorhexidine. An adjunct to periodontal therapy. J Periodontol. 1986;57(6):370-7.
19. Golub LM, Lee HM, Ryan ME, Giannobile WV, Payne J, Sorsa T. Tetracyclines inhibit connective tissue breakdown by multiple non-antimicrobial mechanisms. Adv Dent Res. 1998;12(2):12-26.
20. Pihlstrom BL, McHugh RB, Oliphant TH, Ortiz-Campos C. Comparison of surgical and nonsurgical treatment of periodontal disease. A review of current studies and additional results after 6½ years. J Clin Periodontol. 1983;10(5):524-41.
21. Heasman L, Stacey F, Preshaw PM, McCracken GI, Hepburn S, Heasman PA. The effect of smoking on periodontal treatment response: a review of clinical evidence. J Clin Periodontol. 2006;33(4):241-53.
22. Wilson TG Jr. Compliance and its role in periodontal therapy. Periodontol 2000. 1996;12:16-23.
23. Stambaugh RV, Dragoo M, Smith DM, Carasali L. The limits of subgingival scaling. Int J Periodontics Restorative Dent. 1981;1(5):30-41.

24. Axelsson P, Nyström B, Lindhe J. The long-term effect of a plaque control program on tooth mortality, caries and periodontal disease in adults. Results after 30 years of maintenance. J Clin Periodontol. 2004;31(9):749-57.
25. Claffey N, Egelberg J. Clinical indicators of probing attachment loss following initial periodontal treatment in advanced periodontitis patients. J Clin Periodontol. 1995;22(9):690-6.