



Analysis of Re-Treatment Rates After Initial Periodontal Therapy in a Teaching Hospital: A Retrospective Study

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KEYWORDS

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ABSTRACT:

Background: Despite advances in periodontal therapy, a proportion of patients require re-treatment due to persistent disease or recurrence.

Aim: To evaluate the rate and reasons for re-treatment after initial periodontal therapy in a teaching hospital setting.

Methods: A retrospective chart review was conducted involving 800 patients who underwent initial periodontal treatment between January 2019 and December 2024. Demographic data, clinical parameters, treatment details, and re-treatment variables were extracted. Descriptive and inferential statistics were used to analyse correlations.

Results: Out of 800 patients treated, 112 (14%) underwent re-treatment within 11.3 months. Re-treatment was significantly associated with smoking status, systemic diseases (especially diabetes), poor oral hygiene compliance, and initial disease severity ($p < 0.05$).

Conclusion: Re-treatment was more common in patients with poor systemic control, smoking, and initial moderate-to-severe periodontitis. Emphasis on maintenance and compliance is crucial to reduce re-treatment rates.

1. Introduction

Periodontal diseases are among the most common chronic inflammatory conditions affecting the adult population worldwide. Periodontitis, the advanced stage of periodontal disease, results in destruction of the periodontal ligament, alveolar bone, and soft tissue attachment, ultimately leading to tooth loss if untreated. Nearly 50% of adults have some form of periodontitis, and about 10–15% experience severe disease requiring complex therapy (1,2).

Treatment typically includes non-surgical scaling and root planing (SRP), followed by surgical interventions when necessary, and is supplemented by continuous maintenance therapy (3). Despite following these treatment phases, recurrence or disease persistence in some patients results in the need for re-treatment. Understanding the prevalence and underlying factors

associated with re-treatment helps improve therapeutic outcomes and long-term periodontal stability.

Re-treatment involves repeating SRP, performing new surgical interventions, or, in severe cases, extracting compromised teeth due to recurrent inflammation or deep pockets. Previous studies have reported that systemic factors like diabetes, smoking, and poor plaque control significantly increase the risk of re-treatment (4–6). Poorly controlled diabetes in particular is known to impair healing and host immune responses, facilitating disease recurrence (7,8). Similarly, tobacco use impairs periodontal healing and increases risk for deeper pockets and clinical attachment loss (9,10).

Patient compliance with oral hygiene instructions and adherence to maintenance appointments significantly affects long-term success. Even expertly delivered treatment fails in the presence of inadequate home care



or irregular recall visits (11,12). Longitudinal studies emphasise the importance of regular supportive periodontal therapy (SPT) in reducing the rate of tooth loss and recurrence (13).

Operator-related variables, especially in a teaching institution, also play a role in therapy success. Inexperienced hands, despite supervision, might lead to incomplete debridement or inadequate motivation of patients. However, studies comparing treatment outcomes among students and experienced clinicians have shown minimal difference if adequate supervision and protocols are in place (14).

Globally, reported re-treatment rates vary between 10% and 30%, depending on the study duration, population, and institutional practices (5,13). However, Indian studies on re-treatment rates and associated risk factors are limited, especially in teaching hospital setups catering to diverse socioeconomic populations.

Therefore, this study aimed to assess the frequency and reasons for re-treatment following initial periodontal therapy over five years. It also aimed to correlate re-treatment with systemic conditions, oral hygiene compliance, clinical parameters, and operator type to identify predictive markers for recurrence.

2. Materials and Methods

2.1. Study Design and Setting:

A retrospective observational study was conducted in the Department of Periodontics, Saveetha dental college, analysing case records from January 2019 to December 2024.

2.2. Study Population:

Patient records from January 2019 to December 2024 were reviewed. Inclusion criteria: patients aged 20–70 years diagnosed with periodontitis who completed initial periodontal therapy. Exclusion: incomplete data, follow-up <6 months, or ongoing systemic infections.

2.3. Data Collection:

Data were extracted from the institution's digital record system - DIAS (Dental Information Archiving Software) using a standardised template and included:

A. Demographic Details:

- Age, gender, smoking status

- Systemic diseases: diabetes, hypertension, cardiovascular disease

B. Clinical Parameters:

- Diagnosis: chronic/aggressive periodontitis
- Plaque index (PI), gingival index (GI)
- Probing pocket depth (PPD), clinical attachment loss (CAL)
- Furcation involvement, tooth mobility, bone loss pattern

C. Treatment Details:

- Initial therapy: SRP, flap, regeneration
- Operator type: UG, PG, faculty
- Adjuncts: antibiotics, mouth rinses
- Number of sessions, Phase I completion date, Phase II therapy

D. Re-treatment Data:

- Interval to re-treatment
- Reason for re-treatment
- Type of re-treatment performed
- Oral hygiene compliance was assessed using the Oral Hygiene Index-Simplified (OHI-S) and categorised as good, fair, or poor based on standard scoring criteria.
- Number of recall visits

2.4. Statistical Analysis:

Data were analysed using SPSS v25. Chi-square tests and logistic regression were used to assess associations. $p < 0.05$ was considered statistically significant.

3. Results

Demographics:

Among 800 patients, the mean age was 42.6 ± 11.4 years. Males: 476 (59.5%); females: 324 (40.5%). Smokers: 192 (24%). Diabetics: 160 (20%); hypertensives: 132 (16.5%).



Clinical Baseline:

- Chronic periodontitis: 76%
- Mean PI: 1.9 ± 0.6, GI: 1.8 ± 0.5
- Mean PPD: 4.6 ± 1.1 mm, CAL: 4.2 ± 1.3 mm
- Furcation: 128 patients (16%)
- Vertical bone loss: 228 patients (28.5%)

Treatment Characteristics:

- SRP: 504 (63%), Flap: 188 (23.5%), Regeneration: 108 (13.5%)
- UG: 27.5%, PG: 55%, Faculty: 17.5%, depicted in Figure 1 d.
- Adjuncts used: 572 patients (71.5%)
- Mean sessions: 3.2 ± 1.1

Re-treatment Rate:

- 112 patients (14%) underwent re-treatment as shown in Figure 1a.

- Mean interval: 11.3 ± 4.7 months

- Reasons: Recurrence (57.1%), Persistent pockets (25%), Patient request (17.9%), depicted in Figure 1 b.
- Type: SRP (42.9%), Flap (32.1%), Regeneration (17.9%), Extraction (7.1%)
- Oral hygiene compliance: Good (37%), Fair (39%), Poor (24%), depicted in Figure 1 c.

Significant Associations:

- Smoking ($p = 0.002$)
- Diabetes ($p = 0.007$)
- CAL >5 mm ($p = 0.001$)
- Poor oral hygiene compliance ($p < 0.001$)
- No significance: gender ($p = 0.28$), operator type ($p = 0.09$)



Figure 1: Analysis of Re-treatment After Periodontal Therapy, Figure 1 a: Pie Chart – Shows that 14% of the 800 patients required re-treatment. Figure 1 b: Bar Chart

– Displays the distribution of reasons for re-treatment: recurrence (57%), persistent pockets (25%), and patient request (18%). Figure 1 c: Oral Hygiene Compliance –



Highlights that most re-treated patients had fair or poor compliance. Figure 1: Operator Type – Indicates the distribution of initial treatments by undergraduates (UG), postgraduates (PG), and faculty.

4. Discussion

This retrospective study assessed the re-treatment rates and associated risk factors in 800 patients who underwent initial periodontal therapy in a teaching hospital over a five-year period. The re-treatment rate was 14%, with a mean interval of 11.3 months from the initial treatment to the time re-treatment was rendered. These findings are consistent with previously published data that have reported re-treatment rates ranging between 10% and 30% depending on the population, clinical protocols, and duration of follow-up (1,5,13).

The multifactorial aetiology of periodontitis means that a wide range of host, environmental, and behavioural variables may influence treatment outcomes. Our study confirmed that re-treatment was significantly associated with systemic factors such as diabetes mellitus, behavioural factors like smoking, poor oral hygiene compliance, and initial disease severity as measured by clinical attachment loss (CAL) and probing pocket depth (PPD). No statistically significant association was found with gender or operator type.

4.1. Systemic Risk Factors and Re-Treatment

Diabetes mellitus emerged as a major predictor of re-treatment in our cohort. Periodontal disease and diabetes share a well-established bidirectional relationship. Diabetes contributes to increased inflammation, impaired neutrophil function, altered microbial profiles, and delayed wound healing, all of which compromise periodontal healing and long-term stability (6,7). Several studies have emphasised that poorly controlled diabetics are more prone to recurrent periodontal inflammation and require more intensive maintenance and monitoring (8,9). Our findings are aligned with these studies, reaffirming the need for interdisciplinary management of diabetic patients receiving periodontal therapy.

Another significant risk factor observed was tobacco smoking. Smokers were more likely to require re-treatment compared to non-smokers. The impact of smoking on periodontal disease progression is well-documented. Smoking leads to vasoconstriction, impaired immune response, increased release of

proteolytic enzymes, and a reduction in fibroblast proliferation (10). Even with adequate therapy, smokers may not achieve comparable clinical improvements as non-smokers, and their long-term outcomes are generally poorer (4). These findings underscore the importance of incorporating tobacco cessation programs within periodontal treatment plans to mitigate recurrence risk.

4.2. Oral Hygiene and Maintenance Compliance

The strongest predictor of re-treatment in our study was poor oral hygiene compliance. Nearly 63% of patients requiring re-treatment demonstrated fair to poor compliance with recommended hygiene practices and recall schedules. This aligns with the landmark studies by Axelsson and Lindhe, which demonstrated that periodontal maintenance and patient compliance are more critical for long-term tooth retention than the type of therapy itself (11,12). Even patients who initially respond well to treatment are at risk of recurrence if plaque control is suboptimal over time.

Lang and Tonetti further proposed the concept of Periodontal Risk Assessment (PRA), which includes compliance as a central component influencing outcomes in supportive periodontal therapy (13). This model advocates stratifying patients based on risk and tailoring recall intervals accordingly. Applying PRA models in a teaching hospital setup can help prioritise high-risk patients and allocate resources efficiently to reduce recurrence.

4.3. Clinical Parameters and Initial Disease Severity

Patients with initial CAL >5 mm and deeper PPDs at baseline had higher re-treatment needs, confirming previous findings that residual deep pockets and advanced attachment loss are predictors of disease progression (15). A study by Matuliene et al. indicated that untreated or inadequately treated deep pockets (>6 mm) are strongly associated with future tooth loss, regardless of patient compliance (15). This highlights the importance of thorough initial debridement and timely surgical intervention where necessary to eliminate deep pockets and reduce future re-treatment risk.

Moreover, patients with vertical bone loss and furcation involvement also exhibited a higher tendency for recurrence. These anatomical challenges are often difficult to manage non-surgically and may require regenerative therapy for long-term stability (3). Our



study supports this assertion, as patients initially treated with SRP alone had higher re-treatment rates compared to those who received regenerative procedures.

4.4. Operator Type and Institutional Impact

Interestingly, no statistically significant difference in re-treatment rates was observed among treatments performed by undergraduate students, postgraduate trainees, or faculty members. This suggests that the quality of care delivered was consistent across operator levels, likely due to standardised protocols and close supervision in the institutional setting. Armitage's comparison of SRP outcomes performed by students versus experienced clinicians found similar results, indicating that the learning curve can be mitigated by adequate training and supervision (14).

However, we must interpret this result cautiously. While gross clinical outcomes may be similar, subtle differences in instrumentation technique, patient motivation, and time spent per procedure could influence patient perception and long-term compliance, which were not evaluated in this study. Future studies with qualitative assessments of patient experience may help elucidate this further.

4.5. Timing and Nature of Re-Treatment

Most re-treatments in our study occurred within the first year post-therapy, suggesting a critical window during which relapse is most likely if maintenance is not optimised. These early failures are often attributed to persistent inflammation due to incomplete debridement, inadequate behaviour modification, or unresolved systemic issues. The majority of re-treatments involve repeat SRP or flap surgery, with a smaller fraction undergoing regenerative procedures or extractions. This is in agreement with previous studies that indicate re-intervention often involves conventional therapies rather than advanced modalities (5).

The recurrence of disease within a short span post-therapy also points to potential inadequacies in the initial treatment phase or lack of patient readiness to engage in long-term oral hygiene practices. This calls for enhanced patient education and follow-up immediately after Phase I therapy, especially for high-risk groups.

4.6. Strengths and Limitations

One of the strengths of this study is the large sample size and extended observation period of five years, which increases the reliability of the trends observed. Moreover, the inclusion of patients from a real-world teaching hospital setting adds to the generalisability of the findings, especially in resource-constrained public health environments.

However, the retrospective design inherently limits causal inference. Incomplete records, reliance on subjective documentation of compliance, and absence of microbiological or biomarker data are significant limitations. We also did not stratify diabetes based on glycemic control or smoking based on frequency and duration, which could have added more granularity to the analysis (16).

Furthermore, behavioural interventions such as motivational interviewing, reinforcement sessions, or the use of mobile health tools were not part of the care protocols during this period. Future research should explore the impact of integrating such tools on reducing re-treatment rates (17-18).

Thus, the 14% re-treatment rate observed over five years underscores the persistent challenge of maintaining periodontal stability post-therapy. Systemic conditions like diabetes, lifestyle factors like smoking, and behavioural aspects such as poor oral hygiene compliance significantly affect long-term success. While the clinical and institutional factors were mostly consistent, personalised follow-up strategies, patient education, and risk-based recall programs are critical to minimising re-treatment needs. A multidisciplinary and patient-centric approach must be emphasised in both undergraduate training and clinical practice to improve periodontal care outcomes.

5. Conclusion

Re-treatment following initial periodontal therapy is significantly associated with poor systemic control, smoking, and inadequate oral hygiene. Emphasising patient education, maintenance therapy, and early intervention can reduce the need for re-treatment and improve long-term periodontal stability.

Conflict of Interest:

The authors declare no conflict of interest.



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