

Periodontal Re-treatment in Patients on Maintenance Following Pocket Reduction Surgery

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Abstract

When pocket elimination has been done and periodontal stability has been achieved, patients are advised to be on Maintenance Therapy (MT), also known as Supportive Periodontal Care (SPC). The compliance rate for patients on MT is low, and efforts to optimize acquiescence are only partly successful.

The question of re-treatment of periodontal diseases is rarely addressed in the literature, and it warrants further clinical research.

Aim: To quantify the extent of additional periodontal treatment needed for patients who had previous pocket reduction periodontal surgery and have been on SPC for a minimum period of 12 months.

Methods: Patients in this study had received periodontal treatment, which included pocket reduction osseous surgery with an apically positioned flap. The periodontal residents at Universitat Internacional de Catalunya performed the surgeries. After active periodontal therapy, patients were placed on SPC. Erratic patients are defined when they attended less than 75% of their scheduled maintenance appointments within 1 year. Re-treatment is judged necessary when deep pockets (≥ 5 mm) are identified, presenting with bleeding on probing.

For this study, patients were recalled randomly for a re-evaluation of periodontal conditions. Clinical periodontal parameters are recorded and each patient fills a questionnaire evaluating SPC perception.

Results: 64% of patients showed recurrence of periodontal disease. Smokers who were erratic with SPC showed a 100% recurrence rate.

Conclusion: Considering smokers and non-smokers, preliminary data suggests that in patients who are erratic with SPC, the need for retreatment due to the recurrence of periodontal disease is higher than 70%.

Key Words: Periodontal maintenance, Supportive periodontal care, Periodontalsurgery, Periodontal disease recurrence, Patient compliance, Periodontal re-treatment, Pocket reduction surgery

Introduction

One of the main objectives in periodontal treatment is to help the patient to maintain stability of the periodontal tissues after active therapy and periodontal health has been achieved. Active therapy is referred to as periodontal treatment, which includes non-surgical and surgical therapy [1]. In order to maintain stability of the periodontal tissues, one of the important goals of active therapy is to reduce or eliminate periodontal pockets to provide the patient access for plaque removal. A periodontal pocket is defined as the pathological deepening of a gingival sulcus and is considered one of the principal clinical characteristics of periodontitis. These pockets are reservoirs of bacteria, and their depth precludes plaque removal.

Sites where periodontal pockets persist after non-surgical therapy might be indicated for surgical treatment. Surgical therapy includes resective and regenerative procedures. When pocket elimination has been done and periodontal stability has been achieved, patients are placed on Maintenance Therapy (MT), also known as Supportive Periodontal Care (SPC). It has been shown that with SPC at three month intervals, the majority of sites treated remain stable [2-5]. The patient's compliance to the schedule of recall dental appointments after treatment is considered to be a key factor in preventing the recurrence of periodontal disease. In spite of this, only a minority of periodontal patients conform to the prescribed recommendations, and that efforts to optimize compliance are only partly successful [6].

During maintenance visits, previously treated areas might show periodontal breakdown, which may be indicated for additional periodontal treatment. Such areas might show: increasing probing depths, increased attachment loss, an increase in Bleeding on Probing (BOP), radiographic bone loss, or progressing mobility [7-11]. The goal of maintenance therapy is to detect such areas before there is additional attachment loss and treat them as is indicated. Bleeding on probing and probing Pocket Depth (PD) are the critical site-specific parameters to evaluate the probability of periodontal disease progression [12-14]. Retreatment of such sites includes reinforcement of adequate plaque control techniques by the patient, scaling and root planning with possible occlusal adjustment. Should there be recurrent areas of inflammation, a shorter maintenance interval is usually indicated. The control of BOP and the reducing uncleanable pockets have been suggested as being the primary periodontal objectives of SPC programs. Localized surgical therapy may be necessary if an area has not responded to non-surgical therapy at the time of the next maintenance appointment, or if there is an increase in visible recession as a result of an inadequate zone of attached gingiva [15-19].

In previous reports, the initial as well as the long-term outcome of non-surgical treatment of a large number of subjects with advanced periodontal disease were presented. The studies demonstrated that in about 80% of the subjects, non-surgical treatment was effective in reducing pocket depth and retarding

long-term attachment loss. In the remaining 20% of the subjects who received non-surgical therapy during the first years of SPC there were obvious signs of recurrent disease, which included significantly deep pockets and further loss of attachment at multiple sites [20-22]. It has been documented that a non-surgical treatment approach frequently results in insufficient root debridement especially at sites with pockets over 5mm [23-25]. These are reasons to suggest that in some of the subjects included in previous studies, sites with residual infection exhibited recurrent and progressive disease.

More recently, participation in a carefully supervised SPC has also been shown to be essential for the long-term stability of periodontal reconstructive surgery [26,27]. Considerable research efforts have been made to render SPC programs more efficient. These efforts are aimed at optimizing the delivery of necessary care to high risk subjects for specific teeth and tooth sites, while avoiding unnecessary treatment. The key to these efforts was evaluating the subject and the site specific probability of periodontal disease progression with simple and reliable clinical parameters [11].

A series of investigations have demonstrated that Bleeding on Probing (BOP) and probing pocket depth are the critical site-specific parameters to evaluate the probability of periodontal disease progression [12]. Repeated BOP has been associated with a significant risk of attachment loss [13], while absence of BOP has been shown to be an excellent indicator of periodontal stability. A recent random effect meta-analysis has indicated that repeated BOP is associated with a significantly increased risk for attachment loss, with the reported odds ratio being 2.8 (95% CI, 1.03-7.6, (17).

Increased probing depths have also been associated with a higher risk for progression of treated periodontitis [14-16]. A summary of this evidence has indicated that deep pockets (probing depths ≥ 6 mm) have almost a 10-fold risk of periodontal disease progression [17].

Based on this documentation, control of bleeding on probing and the reduction of deep pockets has been suggested as being the primary periodontal objectives of SPC programs. Although substantial evidence has been gathered regarding the ability of SPC programs to preserve most of the teeth in the majority of periodontally treated subjects, little is known about the prevalence and the incidence of bleeding pockets during SPC [28]. Such information would be important for evaluation of the efficacy of risk management programs as well as for devising strategies for further optimization of them.

Re-treatment studies are rare and various treatment protocols for the recurrence of periodontal disease have been advocated. However, there is not enough evidence to support a specific treatment for the recurrence of periodontal disease. There is still a need for more patient-based studies to include compliance with maintenance and smoking as they relate to treatment outcomes and the requisite for re-treatment. Re-treatment is defined as the therapy given after recurrent periodontal deterioration has been diagnosed in patients involved in a SPC program. SPC includes therapy such as, medicaments, non-surgical procedures and surgical. Re-treatment is indicated when pockets greater than 5mm are identified and BOP is present. It is also indicated when a PD has increased by 3mm accompanied by BOP over three

successive SPC appointments [18].

It would be useful to report the incidence of recurrent periodontal disease on patients under SPC, where compliance is a key factor. Studies have shown that good compliance with SPC can achieve high levels of tooth retention in periodontal patients [19,29].

Aim

The purpose of this cross sectional study was to evaluate the need of re-treatment in a population of adult periodontal patients recommended for supportive periodontal care, and to determine the impact of previous clinical procedures such as flap and osseous surgery on long term periodontal stability.

Methods

This study is a cross-sectional analysis of 33 patients from the Department of Periodontology at Universitat Internacional de Catalunya, conducted in order to determine their need for re-treatment and their compliance with individualized SPC schedules.

Patients who were diagnosed with advanced and/or moderate chronic periodontal disease received periodontal treatment, which included non-surgical therapy along with pocket reduction osseous surgery with apically positioned flaps. The postdoctoral periodontal residents at Universitat Internacional de Catalunya performed the therapy.

Previous treatment and patient selection

Following the completion of pocket reduction surgical treatment with osseous contouring, patients were re-evaluated by the residents, recording clinical parameters such as but not limited to: Plaque Index (PI), Pocket Depths (PD), Bleeding on Probing (BOP), Clinical Attachment Levels (CAL), and Furcation Involvements. The patients were placed on SPC when periodontal stability was determined. Periodontally stable patients were considered the ones who presented with the reduction of probing depths that allowed for plaque removal by the patient and a PI under 20%. Patients were also placed on a regimen of SPC that included recalls every three to four months, professional prophylaxis by the hygiene faculty and repeated reviews of plaque removal techniques by the patient. Medical records and patient charts of the subjects were selected randomly and reviewed in terms of the patient's attendance in the scheduled recall visit. All patients in this study had undergone periodontal resective flap and osseous surgery with pocket reduction as part of their active periodontal therapy.

Patient records were retrieved and the dates of initial diagnosis, active periodontal therapy including dates of nonsurgical and surgical treatment were recorded. The baseline date was on the date of the re-evaluation appointment following active therapy when periodontal stability (no pockets greater than 4mm) had been achieved.

During each SPC visit, a dental hygienist or periodontal resident updated the periodontal chart. Scaling and root planing was routinely performed according to the needs of each patient. Oral hygiene instructions, including the correct use of a toothbrush, interproximal brushing and the use of dental floss, were performed. (O'Leary, plaque index [30].

Clinical evaluation

Randomly selected patients who fit the inclusion criteria presented for an evaluation by the same examiner. The clinical and medical history was updated and the following clinical parameters wererecorded: Age, Gender, Smoking Status, Family History of Periodontal Disease, Tooth Loss (as a result of periodontal disease),

Plaque Control: (i) Plaque Index(ii) Hygiene Technique, Probing: (i) BOP (ii) PD (iii) CAL. Inter-examiner calibration agreement between student and faculty at each probing site.

Furcation Involvement, Initial Prognosis (McGuire, [31], Dental Sensitivity

TM: (i) Recommended frequency (ii) Real Frequency

Complete periodontal charting, an O’Leary Plaque Index, and a questionnaire were completed. The same examiner, who was unaware where the surgeries were performed, took all the measurements.

Recurrence of periodontal disease was identified when,

1) Deep pockets ($5 \geq$ mm) were observed with bleeding on probing.

2) When a total increase in pocket depth of 3 mm was identified and with persistent bleeding on probing in less than a year of SPC [32].

Patients were given a questionnaire to review the compliance on their SPC program. Patient compliance to SPC was recorded. The erratic patients were defined as the ones that attended in less than 75% of their maintenance appointments within 1 year, meaning a patient with a 3 month recall missing more than 1 appointment, or a patient with a 4 month recall missing 1 or more appointment(s). Patients who attended less than 1 maintenance visit within a year were excluded. A Chi-square test was done for the two qualitative variables. One variable was recurrence of periodontal disease and the second variable was patient compliance to SPC appointments.

Inclusion criteria

1. Patients diagnosed with chronic moderate/advanced periodontitis who went through periodontal resective surgery with flap surgery for pocket reduction.
2. Patient older than 18 years.
3. Patient with no systemic conditions other than chronic periodontitis.
4. Plaque index $\leq 20\%$ (O’Leary) after surgical periodontal therapy.
5. Patients with < 4 mm PD and no BOP after re-evaluation of surgical phase.
6. Prescribed maintenance recall time interval of 1 to 4 months.

Exclusion criteria

1. Patients with any systemic disease
2. Patients not attending to maintenance therapy (less than 2 visits in 1 year).
3. Patients with physical incapacity that affects their oral hygiene.
4. Patients under medication that might increase pocket depth. (Cyclosporine, anti-epileptic and calcium beta-blocker drugs)
5. Patients on antibiotics in the last 3 months.
6. Patients with Aggressive Periodontitis

Results

According to the inclusion criteria, a total of 63 patients were eligible for the study. Of these patients, 33 patients came for re-evaluation and signed a written consent. A total of 49 surgical sites were treated with gingival flaps and osseous surgery. There were 21 patients(64%) who had recurrence of periodontal pockets and were in need of additional periodontal treatment, with pockets probing ≥ 5 mm on post-surgical sites. The percentage of compliant patients with SPC for the study sample was 39% and 61% for erratic patients. Plaque indexes were significantly higher for the erratic patients with SPC. There’s a statistical difference (p.0.05) between compliant and erratic patients regarding the need of further periodontal treatment. Erratic patients showed a greater need(49% vs 15%) of retreatment of periodontal disease compared to compliant patients (Table 1).

A higher rate of recurrence of periodontal disease (PD > 4 mm) was found on post-surgical sites in erratic patients and with smoking patients (Table 2). The patients’ oral hygiene improved from the outset of their therapy in all subjects examined. However, a higher Plaque Index (26%) was found on the erratic patients who smoked.

One hundred percent of the patients who were heavy smokers (>10 cigarettes a day) and who were erratic with SPC in the study sample had a need for further periodontal treatment. Additionally, 42% of smokers and ex-smokers who were compliant with SPC also had a need of re-treatment. A lower degree of compliance was seen for smoking patients than non-smokers (Figure 1).

A family history of periodontal disease showed a higher tendency of recurrence, but it did not reach a statistical significance (p.0.05). Subjective outcomes revealed a moderate importance given by the patients towards the perception of SPC (Figure 2).

Discussion

This study sample was taken from patients treated and maintained in an SPC program in a university setting. The results indicated that re-treatment was needed in more than half of the patients studied.

Table 1. Statistical Analysis. Patient Compliance and Recurrence of Periodontal Disease

	Compliant	Erratic	Total
PD Recurrence	5(8.27)	16(12.73)	21
No PD Recurrence	8(4.73)	4(7.28)	12
Total	13	20	33
Percentage	39%	61%	100%

Patient Number (Standard Deviation), PD: Periodontal Disease

Table 2. Periodontal Condition of Post-surgical Sites in Compliant and Erratic Patients at SPC examination.

PD > 4 mm	Compliant	Erratic	Total
Smoking	2	10	12
Non-smoking	7	14	21
PD ≤ 4 mm			
Smoking	0	0	0
Non-smoking	12	4	16
Total	21	28	49

Number of Post-Surgical Sites with probing depth > 4 mm and ≤ 4 mm respectively. PD: Pocket Depth (mm)

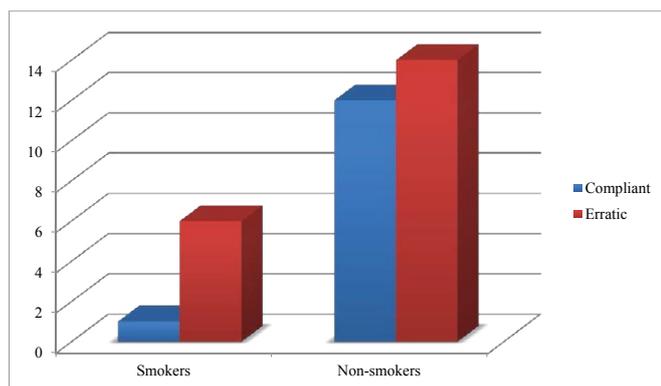
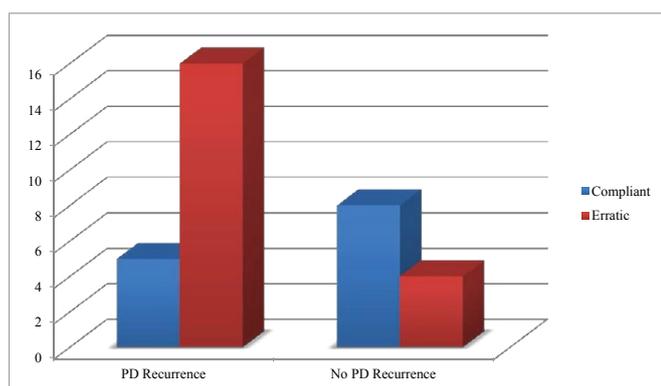


Figure 1. Tobacco Use and Patient Compliance.



PD: Periodontal Disease

Figure 2. Patient Compliance and Recurrence of Periodontal Disease.

There is a lack of comparable data on the level of surgical re-treatment in compliant patients who were well maintained over a significant time period in periodontal specialists' practices. Studies have shown that with proper SPC and patient compliance, a decrease in tooth loss can be achieved in periodontal patients throughout their lives [1,6,8-10,32]. The results found in this study are comparable with results found in the literature regarding SPC and recurrence of periodontal disease. Poor compliance with SPC has been related with disease progression and periodontal breakdown [33-38]. This study shows similar results regarding a greater need of re-treatment in the erratic patient. A greater time interval between SPC appointments than 3-4 months could lead to bacterial repopulation, an increase in number of bleeding pockets, a continuation of periodontal breakdown or caries and subsequent tooth loss. The reduced recurrence of periodontal disease in SPC compliant patients can also be related on the frequency of their maintenance visits.

The initial diagnosis of advanced periodontal disease in the majority of patients could explain the recurrence of deep pockets. These observations are consistent with the notion that previous periodontal destruction may represent a clinical estimation of the patient's susceptibility to periodontal disease [39-44].

Interestingly, a greater number of post-surgical sites showing recurrence of periodontal disease were found with erratic patients when compared with smoking patients. This finding may be the result of the small sample size of smoking patients (Table 2).

Overall, however, patients in this study who smoked showed a greater rate of periodontal breakdown and a need of re-treatment than the non-smoking patients. In the present

study, only seven patients were considered smokers (>10 cig. a day) and only one patient of the seven was compliant with SPC, however, all had recurrence of periodontal disease. Many studies have confirmed a great risk of periodontal breakdown in smokers. An analysis of NHANES III survey data concluded that smokers have a four times greater risk of periodontal disease progression than non-smokers. Of major clinical relevance is the observation that smoking impairs wound healing following scaling and root planning, periodontal surgery, and guided tissue regeneration procedures [39-45].

Central to the current practice of periodontology is the demonstration that the sequential combination of various forms of periodontal therapy with periodic SPC can result in the long-term improvement of periodontal conditions [22,24,27,46,47]. In this study only 39% were compliant with SPC, and 15% of the compliant patients showed recurrence of periodontal disease. In a controlled clinical trial, SPC following surgical periodontal therapy was evaluated [1]. In patients receiving regular SPC at 3-month intervals, the periodontal conditions at the majority of sites remained stable during the 6 years of observation. Conversely, the control group that following active periodontal therapy, which was not incorporated in a supervised program, showed attachment loss greater than 2 mm at 50-70% of sites. The progression of treated periodontal disease in the absence of proper SPC has been confirmed in some retrospective evaluations [2,48].

The high prevalence of periodontal pockets and bleeding on probing following surgical periodontal therapy were also important findings in this study. In a study done by Tonnetti, at the first SPC appointment, 43.6% of the population presented with no bleeding pockets, and 68.1% had less than 5 BOP positive pockets. A sub-population of 17.2% of subjects, however, displayed bleeding on probing in 10 or more pockets. These subjects did not respond well to active periodontal therapy, and they had an incidence of tooth loss of 0.37 ± 0.81 teeth/patient per year. This was almost double than the rate observed in patients with less than 10 residual bleeding pockets after completion of active therapy. These subjects may therefore represent a group of high-risk population [49-52].

One of the main objectives in this study was to assess the success of arresting the progression of periodontal disease in a periodontally treated population. Several long-term studies have indicated that treatment methods including self-performed plaque control and subgingival root debridement are effective in halting the progression of periodontal disease in subjects with moderate as well as advanced forms of destructive periodontitis [20,21]. Findings in this study and several studies, furthermore revealed that

(i) Non-surgical treatment seemed to be less effective than surgical therapy in reducing the probing depths at sites with initial deep pockets,

(ii) Both non-surgical and surgical treatment modalities resulted in loss of attachment at initially shallow pocket sites while at deeper sites some gain of clinical attachment frequently occurred [22-29,53]. Patients who have undergone periodontal surgery with inadequate plaque control continued to lose attachment irrespective of the type of surgery they

received. Patients who had adequate plaque control had long term maintenance of clinical attachment levels, demonstrating that the success of surgical periodontal therapy is aligned to the quality of the SPC and plaque control [20,54,55].

The technique used and the surgeon's experience might influence the outcome of surgical pocket elimination therapy on this study sample. A study done by Herrero [56] revealed a learning curve of residents on different levels of experience. He observed that first year students in a university setting had underprepared the osseous contouring when compared to third year residents while doing surgical crown lengthening [56]. In the present study, 2nd and 3rd year residents performed the surgeries and all surgeries were supervised by specialists during the residents' performing incisions, debridement, osseous contouring, and suturing of treated sites.

Patients with diabetes were not included in this study. These patients are known to have a higher risk of periodontal disease progression [24,57]. A higher rate of recurrence of periodontal disease is expected, especially on those patients with irregular control of their sugar blood levels [57-59]. Patients with diabetes might benefit from a shorter time interval between SPC visits and constant control of their periodontal condition [59].

The use of antimicrobials as an adjunctive to the treatment of periodontal disease has been proven to be beneficial in treating recurrent deep pockets with the aim of reducing the need of additional therapy [60-64]. Patients treated

additionally with local or systemic antibiotics were not included in this study.

A limitation of this study was the size of the sample with 33 subjects; although, a statistical significance was observed, future studies should include a larger study sample.

Conclusions

The results suggest that there is a significant relation between patient compliance in SPC and the recurrence of periodontal disease. The recurrence of periodontal disease was higher in erratic patients (49% vs. 15%) Therefore, a greater need of re-treatment is required for erratic patients when compared to compliant patients with their SPC. After the completion of active periodontal therapy, patients should be informed of a high risk of periodontal disease recurrence if they are not compliant with SPC.

The findings demonstrate that only a moderate degree of importance is given by patients regarding SPC. Efforts to maximize the importance should be conveyed to the patient and particularly if the patient is erratic with SPC and uses tobacco.

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