Long-term Evaluation of Surgical Periodontal Treatment with and without Maintenance Care

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Abstract

A study was conducted on the effectiveness of individual maintenance recalls and the long-term effects of surgical therapy on pocket depth and tooth loss in 43 patients with moderate to advanced periodontal disease. Sixteen of the patients had periodic control and 27 were uncontrolled. Intervals of periodic recall ranged from 3 to 6 months according to individual needs. Pocket depths were measured from four aspects of each tooth and initially classified as shallow (1-3 mm), moderate (4-6 mm) or deep (7 mm or more). Changes in each pocket depth level were determined after 10 years.

Tenth-year comparisons showed that the uncontrolled group had significantly higher mean pocket depth values. Tooth loss rate was 3.6% in the controlled group, and 14.1% in the uncontrolled group, and the mean numbers of lost teeth were 0.69 and 3.63, respectively, in the ten-year period. It was concluded that periodic recalls were essential for long-term success of periodontal surgery.

Introduction

Surgical procedures related to the treatment of inflammatory periodontal disease have been conducted for almost a century without any major improvement in the rationale. If the regenerative procedures which have been the focus of interest for the last several decades are disregarded, the aim of surgical procedures generally seems to be the elimination of pathological pockets. The general expectations of both surgical and non-surgical procedures are to arrest tissue destruction and keep the teeth with their remaining supportive tissues in a healthy state in the mouth in order to fulfill the functional and emotional needs of patients. Hence, the preservation of teeth in the mouth depends on effective and regular oral hygiene activity in keeping with changing oral morphology. In particular, prior to periodontal surgery, the patient is examined with regard to this aspect, and then evaluated for possible surgical treatment. On the other hand, many studies have shown that all patients who have had periodontal treatment should visit a clinician at regular intervals^[1-3].

The purpose of the present study was to investigate, in a ten-year follow-up period, the effectiveness of individual periodic maintenance care programs in a group of patients who had undergone surgical treatment.

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Materials and Methods

The study subjects were 43 patients with moderate to advanced periodontitis, who were treated by the modified Widman flap technique during 1978-1979. These patients were re-examined in 1989. Sixteen of the patients had undergone periodic maintenance care for 10 years following treatment (3 males and 13 females, mean age 35.18 ± 1.73 yr). Periodic maintenance care intervals ranged from 3 to 6 months based on individual needs; meanwhile, additional oral hygiene instructions, sub-and supragingival scaling, and rubber-cup polishing of the teeth were also provided according to patients' needs. Subsequent visits were appointed for each patient at every recall, according to individual oral hygiene levels and periodontal health status. The uncontrolled group comprised 27 individuals who were not present at periodic recalls (15 males and 12 females, mean age 35.52 ± 1.32 yr). These patients visited our clinic at longer intervals only for relief of existing problems.

Initial pocket depth measurements were taken from the mesial, distal, buccal and lingual aspects of each tooth, and were classified as shallow (1-3 mm), moderate (4-6 mm) or deep (7 mm or more). Shallow, moderate and deep pockets were assessed again after ten years. The frequency distributions of pocket type were calculated for each patient. Mean scores and distributions were compared separately between the groups at the baseline and after ten years using Student's *t* test. However, intragroup changes occurring in the ten-year period were evaluated by paired *t* test. Tooth loss occurring during the maintenance period was classified according to cause and to the distribution in the mouth, and the initial pocket depth measurements of the affected teeth were disregarded.

Results

Detailed information about initial pocket depth classifications for the two groups is shown in Table I. Differences between the shallow, moderate and deep pocket depth levels of the controlled and uncontrolled groups were not significant ($P > 0.05$). When the initial pockets classified as shallow, moderate and deep were compared with the values obtained ten years later, the uncontrolled group was found to have significantly higher mean values (Table II). In the controlled group, the shallow pockets exhibited a similar level ($P > 0.05$), and moderate and deep pockets showed a mean decrease of 1.654 mm and 3.568 mm, respectively. These decreases were biometrically significant ($P < 0.001$) (Table III). As shown in Table IV, shallow pocket depths were increased ($P < 0.05$) in the uncontrolled group. Moderate and deep pockets, however, showed decreases of 1.114 mm and 2.918 mm, respectively, which were significant ($P < 0.001$).

Figure 1 shows the baseline and tenth-year distributions for different pocket types. There was no significant difference between the groups with regard to the baseline frequency distributions ($P > 0.05$). In both of the groups, the moderate and deep pocket frequencies decreased while the shallow pocket frequencies increased during the maintenance period. When compared according to the tenth-year percentage distribution, shallow pockets accounted for 78% of all the pockets in the

Table I Intergroup comparisons of baseline pocket depth measurements. $\bar{X}$ = mean value, S. E. = standard error of the mean

	CONTROLLED n = 16	UNCONTROLLED n = 27		
	$\bar{X} \pm$ S. E.	$\bar{X} \pm$ S. E.	t	p
Shallow (1-3 mm)	2.481 $\pm$ 0.058	2.480 $\pm$ 0.057	0.012	>0.05
Moderate (4-6 mm)	4.806 $\pm$ 0.051	4.926 $\pm$ 0.049	1.61	>0.05
Deep ($\geq$ 7 mm)	7.313 $\pm$ 0.399	7.544 $\pm$ 0.070	1.81	>0.05

Table II Intergroup comparisons of tenth-year levels of initially shallow, moderate and deep pockets

	CONTROLLED n = 16	UNCONTROLLED n = 27		
	$\bar{X} \pm$ S. E.	$\bar{X} \pm$ S. E.	t	p
Shallow (1-3 mm)	2.436 $\pm$ 0.11	2.779 $\pm$ 0.099	2.27	<0.05
Moderate (4-6 mm)	3.152 $\pm$ 1.41	3.822 $\pm$ 0.120	3.56	<0.01
Deep ($\geq$ 7 mm)	3.745 $\pm$ 0.269	4.626 $\pm$ 0.255	2.17	<0.05

Table III Intragroup comparisons between baseline pocket depth values and their tenth-year levels in the controlled group

	BASELINE	10 YEARS		
	$\bar{X} \pm$ S. E.	$\bar{X} \pm$ S. E.	t	p
Shallow (1-3 mm)	2.481 $\pm$ 0.058	2.436 $\pm$ 0.11	0.352	>0.05
Moderate (4-6 mm)	4.806 $\pm$ 0.051	3.152 $\pm$ 0.141	11.863	<0.001
Deep ($\geq$ 7 mm)	7.313 $\pm$ 0.399	3.745 $\pm$ 0.269	12.273	<0.001

controlled group, and 65.4% of those in the uncontrolled group, the difference being significant at 0.05. The biometrical differences were not significant ($P > 0.05$) between the two groups for moderate and deep pocket distributions.

Figures 2 and 3 present detailed data for tooth mortality. The numbers of teeth lost due to periodontal destruction were calculated to be 0.69 per capita in the controlled group and 3.63 in the uncontrolled group in the ten-year period. Tooth loss was especially evident for mandibular first incisors and maxillary and mandibular second incisors. Table V demonstrates the rates of tooth loss during the first and second five-year periods, and the rate of total tooth loss determined according to the number of teeth present at the baseline. In the controlled group, no tooth loss occurred during the first five years, whereas the rate of tooth loss was 3.601% during the second five-year period. On the other hand, the rates of tooth

Table IV Intragroup comparisons between baseline pocket depth values and their tenth-year levels in the uncontrolled group

	BASELINE	10 YEARS		
	$\bar{X} \pm S. E.$	$\bar{X} \pm S. E.$	t	p
Shallow (1-3 mm)	2.480 $\pm$ 0.057	2.779 $\pm$ 0.099	2.448	<0.05
Moderate (4-6 mm)	4.926 $\pm$ 0.049	3.822 $\pm$ 0.120	8.554	<0.001
Deep ($\geq$ 7 mm)	7.544 $\pm$ 0.070	4.626 $\pm$ 0.255	9.584	<0.001

Table V Tooth loss rate of each group in ten years

	BASELINE —5 YEARS	5—10 YEARS	BASELINE —10 YEARS
	$\bar{X} \pm S. E.$	$\bar{X} \pm S. E.$	$\bar{X} \pm S. E.$
CONTROLLED n = 16	0	3.601 $\pm$ 1.762	3.601 $\pm$ 1.762
UNCONTROLLED n = 27	2.884 $\pm$ 1.354	11.613 $\pm$ 3.407	14.142 $\pm$ 3.529

loss in the uncontrolled group during the first and second five-year periods were determined to be 2.884% and 11.613%, respectively. Eleven out of 16 patients in the controlled group and 11 out of 27 patients in the uncontrolled group demonstrated no tooth mortality within the ten-year period.

Discussion

Our initial aim in performing this study was to evaluate the long-term effectiveness of periodontal therapy. However, it was not possible to create a control group in which the long-term results of the progression of natural periodontal disease could be determined. On the other hand, there were patients who never returned to the dentist at all after completion of therapy. Therefore we decided to compare these uncontrolled patients with the others who had undergone regular maintenance care. It should be remembered that the pretreatment mean pocket depth values in our study patients shown in Table II and the distributions of shallow, moderate and deep pockets shown in Fig. 1 indicated similar characteristics in both groups at the baseline.

Tenth-year measurements of initially shallow, moderate and deep pockets revealed lower depths in the controlled group than those in the uncontrolled group, the differences between them being clinically and biometrically significant.

The differences between our groups were probably due to the regular individual maintenance program for maintenance of periodontal health, and this is supported by the long-term studies of LINDHE and NYMAN^[4,5], NYMAN and LINDHE^[6], ROSLING et al.^[7], KNOWLES et al.^[8], and AXELSSON and LINDHE^[2]. It is also clear that subjects who did not receive regular maintenance care were at risk of further periodontal breakdown^[9-11].

The number of teeth lost per capita as a result of periodontal disease was 0.69

Fig. 1 Frequency distributions of shallow, moderate and deep pockets

in the controlled group and 3.63 in the uncontrolled group within the ten-year period. It is also possible to categorize the data of previous studies related to tooth loss into two groups. One group includes studies on the long-term results of periodontal treatment. McFALL^[12] reported 100 individuals who received periodontal therapy and lost a mean of 0.68 teeth during 15 years, and HIRSCHFELD and WASSERMAN^[13] also reported 600 patients who had periodontal therapy and demonstrated a mean tooth loss of 0.68 during 20 years. AXELSSON and LINDHE's 6-year study revealed a loss of 0.2 teeth in a recall group and 0.7 in a non-recall group. However, their non-recall group also received regular care from their general practitioners.

The other group of studies concerned with tooth mortality consists of research related to the natural history of periodontal disease. ALBANDAR^[14] who followed up the progression of periodontal destruction radiographically, reported that 142

	MOLARS	PREMOLARS	CANINES	INCISORS	TOTAL	MEAN n = 16
PERIODONTAL ☐	3	1	0	7	11	0.69
ENDODONTAL ☒	3	2	0	0	5	0.31
TOTAL	6	3	0	7	16	1.0

Fig. 2 Distribution of lost teeth in controlled group

subjects ranging in age from 18 to 67 years lost a mean of 0.3 teeth during 6 years. He indicated that although most of these patients did not receive regular periodontal therapy, they had a high level of self-performed dental care habits and also utilized a private dental service on a regular basis. PAPAPANOU, WENNSTRÖM and GRÖNDHAL^[15] conducted a ten-year retrospective study of periodontal disease progression. Full-mouth radiographs taken from 201 individuals at the beginning and end of the ten years showed a mean loss of 3.8 teeth. Therefore, the results of our study are consistent with both of the above two study groups.

Considering that total elimination of plaque is the main objective of total periodontal therapy, maintenance care becomes a significant part of the treatment. On the other hand, WESTFELT et al.^[3] concluded that their results were influenced by high standards of oral hygiene rather than the frequency of recalls. However, there have been no sound and consistent criteria concerning individual duration

of optimal intervals which together would involve both oral hygiene and host defence factors.

Our present results show not only the effectiveness of individual maintenance care but also emphasize the long-term failure of periodontal surgery when maintenance care is not conducted.

	MOLARS	PREMOLARS	CANINES	INCISORS	TOTAL	MEAN n = 27
PERIODONTAL ☐	26	24	9	39	98	3.63
ENDODONTAL ☒	3	2	0	0	5	0.19
TOTAL	29	26	9	39	103	3.82

Fig. 3 Distribution of lost teeth in uncontrolled group

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