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Clinical Report

Surgical Periodontal Therapy at Tokyo Dental College Suidobashi Hospital: A Statistical Profile in 2010–2011


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Abstract

The aim of the present study was to investigate the profile of surgical periodontal therapy performed at the Suidobashi Hospital of Tokyo Dental College, during the period of April 2010 through March 2011. A total of 112 periodontal surgeries in 69 patients (mean age: 51.4 years; 28 men and 41 women) were registered for the data analysis. The surgical interventions performed by 17 dentists comprised 79 cases of open flap debridement, 27 cases of periodontal regenerative therapy with enamel matrix derivative and 6 cases of periodontal plastic surgery. Eighty percent of the surgical sites were in the molar region and 41 cases had furcation involvement. In these patients, an improvement in oral hygiene status was observed prior to surgery: the mean plaque score of 45% at initial visit was significantly reduced to 31% after initial periodontal therapy (p<0.01). At sites that subsequently received open flap debridement or periodontal regenerative therapy, the mean probing depth and clinical attachment level after initial therapy was 6.4 mm and 7.6 mm, respectively. These values were significantly lower than those at initial visit (p<0.01). Lower prevalence of sites with positive bleeding on probing was observed after initial therapy. The initial periodontal therapy performed was considered to be effective in improving the periodontal condition of the sites prior to surgery. More effort, however, is indicated in improvement of patient oral hygiene status.

Key words: Periodontal surgery—Periodontitis—Periodontal regeneration—Plaque control
Introduction

The primary goal of periodontal therapy is to arrest the inflammatory disease process. Treatment involves removal of subgingival biofilm, and the establishment of a local environment and microflora compatible with periodontal health. Elimination or adequate suppression of periodontopathic microorganisms in the subgingival biofilm is virtually impossible for patients to achieve on their own. Highly organized subgingival biofilms are difficult to reach, as they form the apically advancing front of periodontal pockets in close proximity to the degrading connective tissue and alveolar bone. In most cases, performing a thorough periodontal debridement under local anesthesia will stop disease progression and result in clinical improvement. If however, clinical signs of disease activity persist following thorough mechanical therapy, such as increased pocket depths, loss of attachment and bleeding on probing, other pharmacotherapeutic therapies should be considered.

In order to treat moderate to advanced periodontitis, surgical intervention is often indicated after initial or non-surgical periodontal therapy. In the treatment of deep pockets, open flap debridement results in greater pocket reduction and clinical attachment gain. Given the efficacy of periodontal surgery, it should be performed only under certain conditions: the patient must be physically and mentally competent to undergo any type of surgery, and should understand and agree to the procedure and to postoperative management. And most importantly, the selection of a case should be based on the scientific evidence and established clinical guidelines.

The aim of the present study was to investigate the profile of surgical periodontal therapy performed at the Suidobashi Hospital of Tokyo Dental College, during the period of April 2010 through March 2011.

Methods

1. Participants

The study participants were selected from the patient population at Tokyo Dental College Suidobashi Hospital: clinical diagnosis of moderate to advanced periodontitis were made in all patients selected. Written informed consent was obtained from all patients.

2. Procedure

After collection of full medical and dental histories, a periodontal examination was carried out. The following baseline clinical parameters were recorded prior to the surgery by each clinician. Probing depth (PD) was measured using a Williams probe with a force of 0.25 N and rounded to the nearest millimeter. Clinical attachment level (CAL) was measured from the cemento-enamel junction to the apical depth of periodontal probe penetration. Probing depth and CAL were registered at 6 sites. Bleeding on probing (BOP) was recorded as the presence or absence of bleeding following measurement of PD. Tooth mobility was recorded using the Miller index. Presence of furcation involvement was assessed by the Lindhe classification. The presence or absence of supragingival dental plaque was recorded by the O’Leary Plaque Control Record (PCR).

Prior to surgical intervention, all patients received initial periodontal therapy consisting mainly of standard oral hygiene instructions, scaling and root planing. Scaling and root planing was performed as quadrant-based using Gracey curettes and an ultrasonic scaler, usually under local anesthesia. At each appointment, oral hygiene was checked and encouraged and further advice given. Very occasionally, a tooth with a hopeless prognosis was extracted.

Based on re-evaluation performed at 3 to 4 weeks after initial therapy, a further treatment plan with alternatives was presented and informed consent to the proposed surgical intervention obtained from each patient. The surgical interventions were performed as necessary.
3. Measures

A novel surgical record form was developed in order to assess the profile of surgical periodontal therapy. The form contained the following items: patient demographics, systemic condition, smoking status, surgery type and sites. For this record, the surgical site showing the deepest PD was usually selected by each clinician, the clinical parameters (of baseline and initial periodontal therapy) were recorded in the form. The surgical form was filled out by each clinician who performed surgery during April 2010 to March 2011.

4. Data management and statistical analysis

Each patient contributed one to multiple defects; therefore individual site was regarded as the statistical unit. The data were compiled by creating a computerized file and were retrospectively analyzed after databases were stripped of all patient identifiers and a unique code number was used for each subject. The non-parametric Wilcoxon matched pairs signed-ranks test was used to assess changes in quantitative data over time (baseline vs. post initial therapy). A software package (InStat version 3.10 for Windows, GraphPad Software, La Jolla, CA, USA) was used for the statistical analysis. A $p$ value of less than 0.05 was considered statistically significant.

Results

1. Number of surgeries and patient demographics

A total of 112 periodontal surgeries in 69 patients were performed by 17 dentists during the period of April 2010 through March 2011. The patients comprised 28 men and 41 women (Table 1). The mean age was 51.4 years. None of them had serious or uncontrolled systemic diseases. Approximately 10% of the patients (5 men and 2 women) were current smokers.

2. Types of surgery and surgical sites

The types of periodontal surgery performed are shown in Fig. 1. Open flap debridement was the most frequently performed surgery, comprising 71% of total surgical events.

In 27 cases of periodontal regeneration, enamel matrix derivative (EMD; Emdogain® Gel, Biora AB, Malmö, Sweden) was used in 26 cases, and a bone substitute containing atelocollagen and bovine hydroxyapatite particles (Boneject, Koken, Tokyo, Japan) was used in 1 case. No guided tissue regeneration (GTR) was performed.

In 6 cases of periodontal plastic surgery (PPS), 1 case was ridge augmentation, 2 cases were crown lengthening and 1 was apically repositioned flap.

Upper and lower molar regions comprised 80% of the surgical sites. Furcation involvement was found in 41 cases. The least frequent surgical site was the lower incisor and canine area, comprising only 9%.

Table 1 Demographic characteristics of patients (n = 69) and baseline parameters of surgical sites at initial visit (n = 112)

<table>
<thead>
<tr>
<th>Sex</th>
<th>Men</th>
<th>Women</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>28</td>
<td>41</td>
</tr>
<tr>
<td>Age (years)</td>
<td>51.4</td>
<td></td>
</tr>
<tr>
<td>Age range (years)</td>
<td>26–66</td>
<td></td>
</tr>
<tr>
<td>PD (mm)*</td>
<td>7.1 ± 1.8</td>
<td></td>
</tr>
<tr>
<td>CAL (mm)*</td>
<td>7.9 ± 2.3</td>
<td></td>
</tr>
<tr>
<td>BOP + (%)</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>TM*</td>
<td>0.6 ± 0.6</td>
<td></td>
</tr>
<tr>
<td>PCR (%)*</td>
<td>45.3 ± 16.0</td>
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PD; probing depth, CAL; clinical attachment level, BOP; bleeding on probing, TM; tooth mobility, PCR; O’Leary plaque control record.

*pmean ± standard deviation.

BOP + (%) = Number of BOP-positive sites/total number of surgical sites recorded.

Fig. 1 Distribution of surgical cases

Numbers of cases are indicated.

OFD; open flap debridement, REG; periodontal regeneration, PPS; periodontal plastic surgery
3. Oral hygiene status and periodontal parameters at baseline and post initial therapy

1) Oral hygiene status

When the oral hygiene status of the patients was assessed by O’Leary PCR, the mean score at initial visit was 45% (Table 1). After initial periodontal therapy, it was reduced to 31% (range; 12–63%). There was a statistically significant difference between scores at pre and post initial therapy (p < 0.01, Wilcoxon matched pairs signed-ranks test).

2) Probing depth and clinical attachment level

At surgical sites, the mean PD value of 7.1 mm at initial examination was significantly reduced to 6.4 mm after initial therapy (p < 0.01, Fig. 2a). Likewise, the mean CAL value of 7.9 mm at initial examination was significantly reduced to 7.6 mm after initial therapy (p < 0.01, Fig. 2b).

3) Bleeding on probing

The mean prevalence of BOP-positive sites at initial examination was 83% (Table 1). It was reduced to 43% after initial therapy.

4) Tooth mobility

There was no significant difference in tooth mobility between pre and post initial therapy intervals (p = 0.276).

Discussion

In the present study, the initial periodontal therapy performed in the patients appeared to be effective in improving periodontal parameters such as PD, CAL and BOP. However, the improvement in pre-surgical oral hygiene status of these patients was rather modest; the mean PCR was 31% after initial therapy. Chronic periodontal disease can be successfully treated by non-surgical or surgical mechanical therapy provided adequate plaque control is maintained during the supportive phase of treatment. It is thought that more effort should be directed at improvement of oral hygiene status of these patients.

Since periodontal surgical procedures are financially costly, time consuming and technically demanding, an evidence-based decision-making process is important in treatment planning. In a systematic review of the effect of surgical or non-surgical debridement for the treatment of chronic periodontitis, Heitz-Mayfield et al. reported that when sites with initial PD ≥ 4 mm were treated by open flap debridement, there was significantly less CAL gain than with the scaling and root planing. The PD reduction was significantly greater following open flap debridement procedure. In our study, none of the surgical sites presented initial PD ≤ 4 mm, thus in agreement with the criteria suggested by Japanese Society of Periodontology and the concept of “critical probing depth” postulated by Lindhe et al. In long-term observation of periodontal treatment, there is a general understanding that differences in clinical effects between
conventional surgical and non-surgical periodontal therapies become small. For instance, Kaldahl et al. found no differences in PD reduction between sites treated by modified Widman and root planing by the end of year 3 in 5 to 6-mm sites and by the end of year 5 in ≥7-mm sites, although flap operation with osseous surgery produced greater PD reduction in ≥5-mm sites through year 7 of supportive periodontal therapy. It is thus important to longitudinally monitor clinical outcomes in surgical patients.

In the present study, the predominant choice for regenerative therapy was the use of EMD: Emdogain® Gel. In earlier studies, we evaluated the clinical efficacy of EMD therapy. A Cochrane review reported that there was no evidence of clinically important differences between GTR and EMD. Guided tissue regeneration procedures require a certain level of clinical skill. Possible complication by an early exposure of GTR membrane may significantly compromise healing. These may be the reasons why EMD therapy was favored among the clinicians at our hospital.

Periodontal plastic surgery is defined as surgical procedures performed to prevent or correct anatomical, development, traumatic or plaque disease-induced defects of the gingiva, alveolar mucosa, or bone. Esthetics represent an inseparable part of today’s oral therapy, and it is becoming more and more important to preserve or enhance patient esthetics. In the present study, only 6 cases of PPS were identified. In our practice setting, it is not common for a patient to specifically request a PPS. However, given the importance of patient periodontal esthetics and functional condition, more effort may be needed to identify potential problems and suggest an appropriate PPS to the patient. Toward this end, it is also necessary to increase our surgical skills to satisfy the potential needs.

Heitz-Mayfield et al. also stated that patient preference and patient-based outcomes were not reported in any of the studies included in the systematic review and this area should be addressed in future research. In relation to this issue, we have been conducting a series of studies focusing on the oral health-related quality of life in patients with periodontitis, and reported the effects of non-surgical initial therapy and periodontal surgery. Comprehensive periodontal care is our clinical commitment, and we intend to feed back our research findings into our clinical practice. Our current focus is on evaluating outcomes of the surgeries.

In this study, we only analyzed surgical cases that were reported and registered by the clinicians. No attempts were made to analyze hospital records in order to search unreported surgical cases. We speculate that more surgeries were actually performed (and not registered) in this period, and this is a limitation of the present study. Also, the periodontal parameters were measured by each clinician who performed surgery; therefore a certain degree of inter-examiner variation is expected.

In conclusion, during the period of April 2010 through March 2011, open flap debridement was the predominant surgical intervention performed at the Suidobashi Hospital, followed by regenerative therapy with EMD. Initial periodontal therapy was considered to be effective in improving the periodontal parameters of the sites. However, more effort is indicated to improve the oral hygiene status of the patients.

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