Treatment of Severe Chronic Periodontitis with Surgical and Prosthetic Intervention: A 9-year Follow-up Case Report

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Abstract

A 60-year-old woman presented with the chief complaint of mobility of tooth #16. Gingival swelling and calculus were observed. Clinical examination revealed that 49.4% of sites had a probing depth (PD) of ≥4 mm and 72% of sites bleeding on probing. Radiographic examination revealed vertical bone resorption in #35 and horizontal resorption in other regions. Periapical region radiolucency on #16 and 27 suggested a perio-endo lesion. The clinical diagnosis was severe chronic periodontitis. Initial periodontal therapy mainly comprised the following: oral hygiene instruction; quadrant scaling and root planing (SRP); extraction of #16, 27, and 31; and placement of provisional restorations. Open flap debridement was performed for teeth with a PD ≥4 mm. Bone defects exceeding the root apex were found in #17, 41, 42, and 45 intraoperatively. Teeth #41, 42, and 45 were extracted. After confirming the stability of the periodontal tissue, final prostheses were placed on #14–17, 13–22, 33–37, 33–43, 44–46, and 47. Following reevaluation, the patient was placed on supportive periodontal therapy (SPT). After 6 years, the patient experienced dull pain in and pus discharge from #17. Repeated SRP yielded no improvement, so the tooth was extracted and a removable partial denture placed on #16 and 17. Nine years have passed since the start of SPT and the level of plaque control has remained adequate and periodontal condition stable.

Key words: Chronic periodontitis — Motivation — Plaque control — Supportive periodontal therapy — Prosthodontic treatment
Introduction

The main cause of periodontal disease is bacterial infection, the immune response to which can result in the destruction of periodontal tissues if the ensuing inflammation persists. The goal of periodontal therapy is to arrest the inflammatory disease process. Plaque control is important in treating periodontitis, and this involves removing subgingival biofilm and establishing a favorable local environment. Recolonization by subgingival microbiota can occur following scaling in deep pockets. In treating deep pockets, open flap debridement results in greater pocket reduction and clinical attachment gain. An adequate level of plaque control is needed to prevent inflammation and promote healing after periodontal surgery. Improving patient motivation is also important throughout the course of treatment.

Here we report a case of severe chronic periodontitis requiring open flap debridement and prosthodontic treatment which was maintained successfully for 9 years.

Case Presentation

Written informed consent was obtained from the patient for inclusion in this report.

1. Oral history

In May 2004, a 60-year-old woman was referred to the Clinic of Conservative Dentistry at Tokyo Dental College Chiba Hospital by her dentist with the chief complaint of mobility of tooth #16, which she had first noticed more than a year earlier. She had also experienced occasional gingival swelling at this site. In May 2004, she noticed an increase in the mobility of this tooth. Although the patient had received treatment for dental caries and undergone extraction of a tooth, she had no experience of periodontal treatment.

2. Clinical assessment and diagnosis

She was systemically healthy and a nonsmoker. Her parents used removable dentures, but the reason for tooth extraction was unknown.

Figure 1 shows an oral view obtained at her first visit (baseline). She had 28 teeth. Gingival swelling and calculus were observed. The guiding teeth were #12, 14, 27, 37, and 42–44 for right lateral movement, and 24 and 33 for left movement. Labial malposition of #23 was evident. Her dental arch was saddle-shaped. Deep overbite and crowding of the mandibular anterior teeth were observed.

The results of the baseline periodontal examination are shown in Fig. 2. Mean probing depth (PD) was 4.1 mm, with a maximum value of 9 mm. Sixty-three out of 168 sites (37.5%) had a PD of 4–6 mm and 20 sites (11.9%) a PD of ≥7 mm. Bleeding on probing (BOP) was observed in 72% of sites. Pus discharge was observed from tooth #16. Tooth mobility was observed in #11, 12, 16, 17, 22, 26, 27, 31–33, and 41. Degree I furcation involvement was found in #16, 46, and 47. Degree II furcation involvement was found in #16. The level of plaque control as assessed according to the O’Leary plaque control record (PCR) was 80%. She brushed her teeth only once a day, and her interest level toward oral health appeared to be low.

The radiographic examination at baseline (Fig. 3) revealed generalized horizontal and vertical bone loss in #35. Periapical radiolucency on #16 and 27 suggested a perio-endo lesion. Degree I furcation involvement in the distal area and degree II in the mesial area were observed in #16.

Based on an earlier reported system of classification, the clinical diagnosis was severe chronic periodontitis.

Clinical Procedures and Outcomes

1. Prognosis

The prognosis for #16 was determined to be ‘hopeless’ due to furcation involvement and mobility. This was also the case for #27 and 31 due to the presence of deep bone defects extending as far as the root tip and...
mobility. Meanwhile, the prognosis for #17, 32, and 41 was ‘poor’ due to the presence of deep bone defects and mobility. This was also the case for #35, 42, 44, and 45 due to the presence of deep bone defects.

2. Treatment planning

The following treatment plan was explained to the patient and informed consent obtained.

1) Initial periodontal therapy

This consisted of oral hygiene instruction, quadrant scaling and root planing (SRP), extraction of #16, 27, and 31, and placement of provisional restorations (#15–17).

2) Reevaluation

3) Periodontal surgery
Periodontal surgery for sites with a PD of \(\geq 4\) mm.

4) Reevaluation
5) Treatment for recovery of oral function
6) Supportive periodontal therapy (SPT) or maintenance

3. Treatment process

A detailed outline of the treatment process is shown in Table 1.

1) Initial periodontal therapy

Initial periodontal therapy consisted mainly of oral hygiene instruction, quadrant SRP, and tooth extraction (#16, 27, and 31). Provisional restorations were placed on #15–17.

At reevaluation, the score on the PCR revealed a marked improvement of from 80 to 19%. The mean PD was reduced from 4.1 to 3.0 mm, while the mean BOP was reduced from 72 to 30%.

2) Periodontal surgery

Open flap debridement was performed on #12–22, 17, 32, 33, 41, 42, and 45–47 (Fig. 4). Bone defects exceeding the root apex were found intraoperatively in #17, 41, 42, and 45. Meanwhile, tooth #17, which presented with no movement or pain, was preserved as the patient did not want to have a removable partial denture. Teeth #41, 42, and 45 were extracted. Root canal treatment was performed in #46. Pulpectomy of #44 had to be performed due to postoperative hypersensitivity and problems with abutment parallelism. A provisional restoration was placed on #33–43 and 44–46. At this time, the PCR score was 18%.

3) Treatment for recovery of oral function

As a result of a reevaluation at 4 months after periodontal surgery, prosthetic therapy was performed on #14–17, 13–22, 35–37, 33–43, 44–46, and 47. A diagnostic wax-up was performed (Fig. 5a). Pulpectomy of #11 had to be performed due to its postoperative hypersensitivity and problems with abutment parallelism. With regard to occlusal contact, group function on the left side and cuspid guidance on the right side were tested with provisional restorations (Fig. 5b). No space was available for placement of a prosthetic at #34 due to mesial inclination of 35. No problems were identified with this occlusal guidance, and this was adopted in the final restorations as well. Subsequently, final prostheses were placed on #14–17, 35–37, and 33–43, with a fixed bridge for 44–46 and crown restoration for 13–22 and 47 (Fig. 5c).

4) Supportive periodontal therapy

At reevaluation, gingival inflammation showed an improvement (Fig. 6). Sites with a PD of \(\geq 4\) mm were found in #17 and 47 (Fig. 7). However, the values for the PCR and BOP were 18 and 6%, respectively, indicating an
### Table 1  Treatment process

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>May 2004</td>
<td>Initial periodontal therapy</td>
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<tr>
<td></td>
<td>- Plaque control</td>
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<tr>
<td></td>
<td>- Quadrant SRP</td>
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<td></td>
<td>- Extraction (#16, 27, 31)</td>
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<td></td>
<td>- Placement of provisional restoration (#15–17)</td>
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<tr>
<td>February 2005</td>
<td>(Reevaluation)</td>
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<td></td>
<td>Surgical periodontal therapy</td>
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<tr>
<td></td>
<td>- Open flap debridement (#17, 12–22, 32, 33, 46, 47)</td>
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<td></td>
<td>- Extraction (#41, 42, 45)</td>
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<td></td>
<td>- Root canal treatment (#44, 46)</td>
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<td></td>
<td>- Placement of provisional restoration (#33–43, 44–46)</td>
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<tr>
<td>February 2006</td>
<td>(Reevaluation)</td>
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<tr>
<td></td>
<td>Treatment for recovery of oral function</td>
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<tr>
<td></td>
<td>- Diagnostic wax up (#14–17, 13–22, 35–37, 33–43, 44–46, 47)</td>
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<tr>
<td></td>
<td>- Pulpectomy (#11)</td>
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<td></td>
<td>- Placement of provisional restoration (#14–17, 13–22, 35–37, 33–43, 44–46, 47)</td>
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<td></td>
<td>- Crown restoration (#13–22, 47)</td>
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<td></td>
<td>- Bridge prosthesis (#14–17, 35–37, 33–43, 44–46)</td>
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<tr>
<td>April 2007</td>
<td>(Reevaluation)</td>
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<td></td>
<td>Supportive periodontal therapy</td>
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<td></td>
<td>- Oral hygiene instruction</td>
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<td>- Professional tooth cleaning</td>
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<td>September 2013</td>
<td>(Reevaluation)</td>
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<td></td>
<td>- Extraction (#17)</td>
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<td>- Removable partial denture (#16, 17)</td>
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<td>December 2013 to present</td>
<td>(Reevaluation)</td>
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<td>Supportive periodontal therapy</td>
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<tr>
<td></td>
<td>- Oral hygiene instruction</td>
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<td>- Professional tooth cleaning</td>
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SRP: scaling and root planing

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**Fig. 4** During open flap debridement for (a) #12–22 (March 2005), (b) #17 (April 2005), (c) #32, 33 (May 2005), (d) #46 and 47 (September 2005)
Radiographic examination revealed a general improvement in bone level (Fig. 8). Therefore, periodontal status was judged to be stable and the patient placed in a recall system for SPT. According to Periodontal Risk Assessment\(^\text{9}\), the risk at SPT was determined to be moderate. The recall interval was set to every 3 months because #46 and 47 still showed furcation involvement.

At 6 years after the start of SPT, the patient noticed dull pain in and pus discharge from #17. Repeated SRP yielded no improvement. Therefore, the tooth was extracted with the consent of the patient. A removable partial denture was placed on #16 and 17 at this stage as the patient did not wish for a dental implant. Nine years have passed since the start of SPT and the level of plaque control has remained favorable (Fig. 9).

At the latest recall examination, the periodontal condition was still stable (Fig. 10). Although #47 showed a PD of ≥4 mm, the mean PD value was 2.8 mm, while the PCR score was 18% (Figs. 9 and 11). The bone level has remained stable (Fig. 12). Motivation for plaque control was considered to be adequate.
Discussion

At her first visit, the patient was 60 years old and had had no experience of periodontal treatment, although she had received treatment for dental caries and tooth extraction. The baseline PCR score was 80%, which was considerably higher than the mean score of 49% among patients visiting our clinic (17). In order to increase motivation towards periodontal treatment, the patient was given repeatedly given explanations regarding the pathogenesis and progression of periodontal disease and the need for plaque control. This was done as part of instruction on oral hygiene by using oral photographs and other visual materials such as a dental model and illustrations.
of periodontal tissue. The most important factor in both prevention and treatment of periodontal disease is the individual’s standard of daily self-performed oral hygiene\(^\text{18}\). In this case, a progressive improvement was observed in the PCR score (Fig. 9).

At the first visit, crowding of the mandibular anterior teeth, a saddle-shaped dental arch, and labial malposition of #23 were observed. The patient refused the initial plan for orthodontic treatment, however. Therefore, prosthetic treatment was selected instead. In an earlier report, we described orthodontic and periodontal treatment in patients with chronic periodontitis and malalignment\(^\text{15}\). In selecting treatment modalities aimed at recovering oral function, many factors must be taken into consideration, including the condition of the periodontal tissue, age, and patient preferences. In the current case, the patient initially indicated that she did not want to have a partial

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**Fig. 10** Oral view at 9 years from start of SPT

**Fig. 11** Periodontal examination at 9 years from start of SPT
denture. The teeth to be extracted were carefully selected and prosthetic treatment options presented to the patient before extraction. To give the patient a better understanding and feeling for the final outcome, a diagnostic wax-up was presented and the shape and occlusion of provisional restorations adjusted. After careful consideration, the final prosthesis was placed to obtain recovery of oral function. An association has been demonstrated between deep periodontal pockets resulting from alveolar bone destruction and an increase in the number of tooth lost\(^2\). Although extraction was indicated for tooth #17, it was preserved during periodontal surgery. The patient finally consented to its extraction, however, when she felt pain at this site during SPT. If the prognosis for a particular tooth is hopeless, it is necessary to continue to explain the situation and persuade the patient to accept the necessary treatment to ensure better maintenance of the periodontal tissue. Eichner\(^5\) showed the importance of occlusal support in the molar area. The relationship between tooth loss and temporomandibular disorders has also been reported\(^10\). Although the concept of a shortened dental arch\(^8\) has been introduced and used, the method of prosthetic treatment to be employed in such cases remains controversial. In the present case, a removable partial denture was finally selected. At present, the patient uses the denture without significant discomfort. This indicates the need to continue to carefully examine dentures and abutment teeth.

According to Periodontal Risk Assessment\(^6\), the risk at SPT was determined to be moderate. Therefore, the recall interval was set at every 3 months. The patient’s level of plaque control was adequate (PCR <20%) at the start of SPT (Fig. 9). An adequate level of plaque control needs to be maintained throughout treatment. The maintenance of good oral hygiene is of paramount importance in periodontal treatment, and it has been shown to prevent the progression of periodontitis\(^2,5,7\). It has been shown that tooth loss was minimized over 30-years of periodontal maintenance\(^4\). In the present case, the periodontal condition has remained stable, although she lost one tooth at 6 years after the start of SPT. To prevent further tooth loss, the condition of the periodontal tissue, level of occlusal interference, and degree of furcation involvement need to be carefully evaluated. The patient is currently 72 years old. Therefore, her systemic condition and age-related change also need to be assessed.

It is considered difficult to maintain patient motivation when providing long-term periodontal maintenance\(^8\). Scheduling recall
appointments at an appropriate interval is important in enhancing motivation. In the present case, both periodontists and dental hygienists spent time in explaining the etiology of periodontitis, and tried to make the patient understand the importance of her participation in the treatment process. We believe that a good patient-clinician relationship was established over the years as the patient continued to receive SPT. This could well be the reason that periodontal tissue conditions have remained favorable.

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