Bull Tokyo Dent Coll (2014) 55(4): 217–224

Case Report

Periodontal Therapy for Severe Chronic Periodontitis with Periodontal Regeneration and Different Types of Prosthesis: A 2-year Follow-up Report

Takashi Kinumatsu[1)], **Kazuhiro Umehara**[2)], **Kyosuke Nagano**[3)] **and Atsushi Saito**[1)]

[1)] *Department of Periodontology, Tokyo Dental College, 2-9-18 Misaki-cho, Chiyoda-ku, Tokyo 101-0061, Japan*
[2)] *Umehara Dental Office, 123 Dote-machi, Hirosaki-shi, Aomori 036-8182, Japan*
[3)] *Nagano Dental Clinic, 3-641-5 Kamiyama-cho, Funabashi-shi, Chiba 273-0046, Japan*

Received 1 May, 2014/Accepted for publication 4 August, 2014

Abstract

We report a patient with severe chronic periodontitis requiring regenerative periodontal surgery and different types of prosthesis in the maxillary and mandibular regions. The patient was a 57-year-old woman who presented with the chief complaint of occlusal pain. An initial clinical examination revealed that 73% of sites had a probing depth of ≥4 mm, and 60% of sites exhibiting bleeding on probing. Radiographic examination revealed vertical bone defects in the molar region and widening of the periodontal ligament space around teeth #17 and 24. Initial periodontal therapy was implemented based on a clinical diagnosis of severe chronic periodontitis. Surgical periodontal therapy was subsequently performed at selected sites. Periodontal regenerative therapy using enamel matrix derivative was performed on #14, 15, and 35–37. Tunnel preparation was performed on #46 as it had a 2-wall vertical bony defect and Degree 3 furcation involvement. Other sites with residual periodontal pockets were treated by modified Widman flap surgery. After a re-evaluation, functional rehabilitation was implemented with a removable maxillary partial denture and a fixed mandibular bridge. No further deterioration was observed in the periodontal condition of most of the teeth during a 2-year period of supportive periodontal therapy (SPT). The patient is currently still undergoing SPT and some minor problems remain. However, the results suggest that treatment and subsequent maintenance for severe periodontitis with traumatic occlusion can be successful as long as the appropriate periodontal and prosthodontic treatment is planned and careful SPT carried out.

Key words: Periodontitis — Supportive periodontal therapy — Periodontal regeneration — Prosthodontic treatment

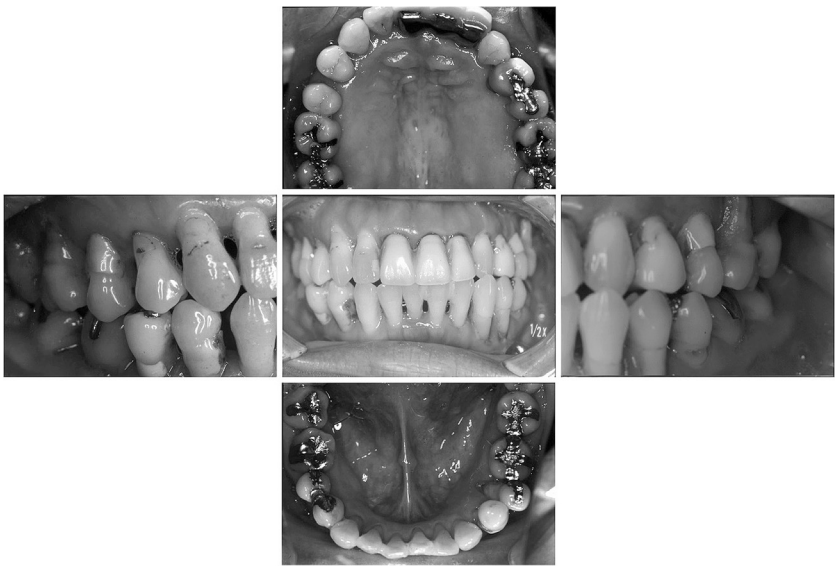

Fig. 1 Oral view at baseline

Introduction

The onset of periodontal disease is associated with the presence of bacteria in plaque biofilm[11]. The initial non-surgical periodontal therapy is the most important element of treatment in reducing periodontal pathogens in such cases[4]. It is, however, important to consider other elements such as the host environment and occlusal factors. Occlusal trauma, defined as injury resulting in tissue changes within the attachment apparatus as a result of occlusal force, is a modulator of periodontitis[12]. Occlusal trauma is classified based on its mechanism: primary occlusal trauma is caused by excessive occlusal force in a tooth with a healthy periodontium; secondary occlusal trauma occurs when a tooth surrounded by compromised periodontal tissue is exposed to normal or excessive force. When severe periodontitis is present, secondary occlusal trauma can induce increased bone resorption. Therefore, it is necessary to pay careful consideration to occlusion in treating patients with severe periodontitis.

Here, we present a patient with severe chronic periodontitis requiring periodontal surgery including regenerative therapy and different types of prostheses in maxillary and mandibular regions.

Case Report

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

1. Baseline examination

In July 2006, a 57-year-old woman visited the Clinic of Conservative Dentistry at the Tokyo Dental College Chiba Hospital with the chief complaint of occlusal pain in the maxillary right molar. Apart from anemia, the patient was in good general health. She had a history of caries treatment and had received regular check-ups every 6 months at a local dental office.

The mandibular dental arch was saddle-shaped and the maxillary dental arch parabolic (Fig. 1). Premature contact was observed in tooth #17. Lateral inclination was observed in #33–35, 44, and 45; reversed occlusion was observed in #33 and 34; and cusp-to-cusp

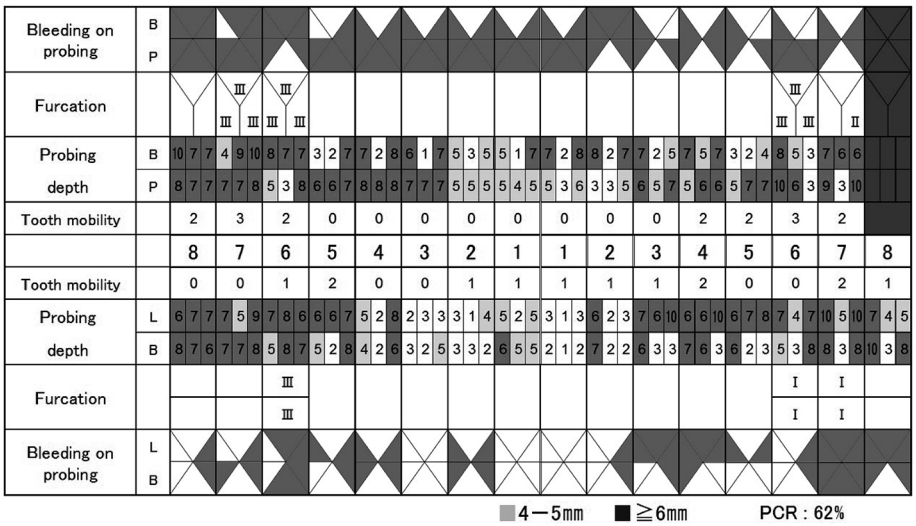

Fig. 2 Periodontal examination at baseline

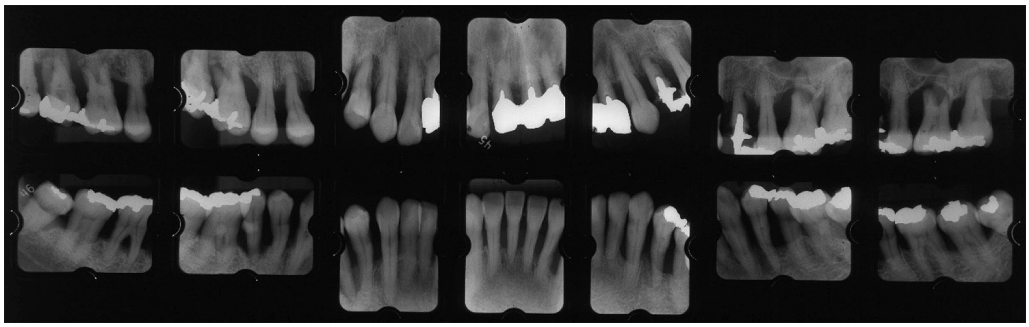

Fig. 3 Radiographic view at baseline

occlusion was seen in #43–45 together with a small amount of overjet. In terms of occlusal guidance, lateral movement indicated group function, and balancing-contact interference was observed in #16 and 47. The results of the periodontal examination at the first visit are shown in Fig. 2. Sites with a probing depth (PD) of ≥5 mm were observed almost throughout the oral cavity. Radiographic examination (Fig. 3) revealed vertical bone defects in #14, 16, 17, 24, 26, 33, 34, 44, and 45, and widening of the periodontal ligament space in #18 and 24. The diagnosis of furcation involvement[8] was Degree 3 for #16, 17, 26, and 46; Degree 2 for #27; and Degree 1 for #36 and 37. The level of plaque control as assessed according to the O'Leary Plaque Control Record (PCR)[9] was 62%.

Poor plaque control, partly due to gingival recession, and occlusal trauma were considered to be etiological factors. The clinical diagnosis was severe chronic periodontitis with occlusal trauma[3].

2. Treatment planning

1) Initial periodontal therapy comprising

(1) oral hygiene instruction; (2) full-mouth scaling and root planing (SRP); (3) occlusal

Table 1 Treatment process

July 2006	Initial periodontal therapy • Plaque control • Full-mouth SRP • Extraction (#16, 17, 26, 34, and 45) • Occlusal adjustment (#18 and 24) • Treatment denture: Removable (#16, 17, and 26) : Fixed (#35–46)
February 2008	(Re-evaluation) Surgical periodontal therapy • Regenerative therapy with Emdogain® Gel (#14, 15, 35–37) • Modified Widman flap surgery (#18, 23–25, 44, 46, 47) (#24 was extracted during surgery) • Tunnel preparation (#46)
June 2011	(Re-evaluation) Treatment for recovery of oral function • Restorative treatment (#11, 21–23, 25) • RPD placement (#16, 17, 24, and 26) • Fixed denture placement (#35–46)
June 2012 to present	(Re-evaluation) Supportive periodontal therapy • Plaque control • PMTC (Professional Mechanical Tooth Cleaning) • SRP • Occlusal adjustment

adjustment for #18 and 24; (4) extraction of #16, 17, 26, 34, and 45; (5) placement of a removable treatment denture for #16, 17, and 26; and (6) placement of a temporary restoration (fixed type) for #35–46.

2) Re-evaluation

3) Surgical periodontal therapy comprising (1) modified Widman flap surgery for #18, 21–24, 27, 44, and 46–48; and (2) regenerative therapy with enamel matrix derivative (EMD) for #14, 15, 36, and 37.

4) Re-evaluation

5) Treatment for recovery of oral function (including prosthetic and/or orthodontic treatment)

6) Supportive periodontal therapy (SPT)

3. Treatment process

The outline of the treatment process is shown in Table 1.

1) Initial periodontal therapy

Initial periodontal therapy consisting mainly of tooth brushing instruction (Bass method), full-mouth SRP, occlusal adjustment (#18 and 24), and extraction (#16, 17, 26, 34, and 45) were performed. Furthermore, a removable treatment denture was placed for #16, 17, and 26. To provide tentative occlusion, a fixed temporary restoration was placed on #35–46 as the patient did not wish to undergo orthodontic treatment.

2) Re-evaluation

The status of patient plaque control improved from 62 to 18% after initial periodontal therapy. The prevalence of bleeding on probing (BOP) was reduced from 60 to 5%. A remarkable improvement was observed in the percentage of sites with a PD ≥4 mm, from 73 to 14%. Residual deep pockets with vertical bone defects were evident at #14, 15, 24, 35–37, 44, 46, and 47.

3) Surgical periodontal therapy

Regenerative therapy with Emdogain® Gel was performed on #14, 15, and 35–37 to treat deep intrabony defects (Fig. 4). Modified Widman flap surgery and tunnel preparation

Fig. 4 Periodontal regenerative therapy with EMD (#36, 37)

Fig. 5 Tunneling procedure (#46)

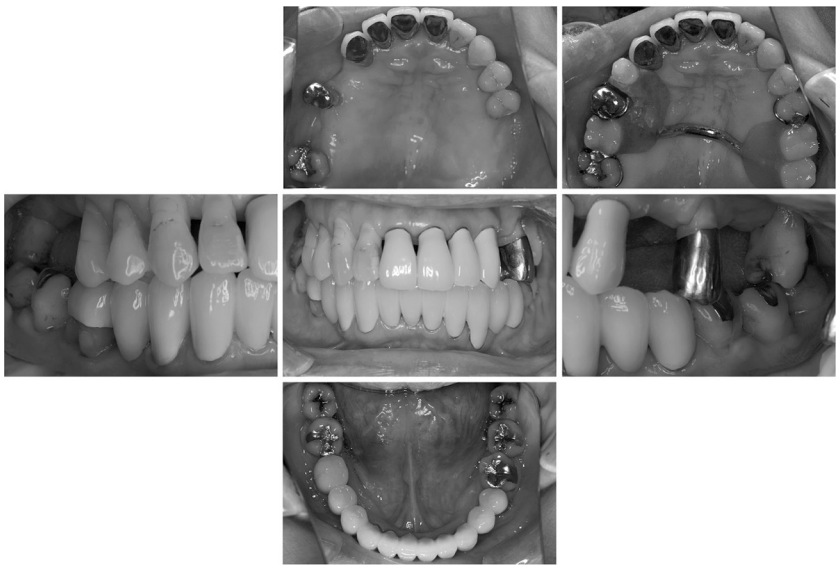

Fig. 6 Oral view at start of SPT

was selected for #46 as this tooth exhibited Degree 3 furcation involvement (Fig. 5). Modified Widman flap surgery was also implemented for #18, 23–25, 44, 46, and 47 to reduce periodontal pockets. Intraoperatively, #24 had to be extracted due to external tooth resorption. Odontoplasty was performed to remove an enamel drop on the mesial root of #18.

4) Re-evaluation was performed

5) Treatment for recovery of oral function

Restorative treatment was implemented at 6 months postoperatively. At this time, occlusal support was A3 according to the Eichner classification[2]. Veneer crowns (#11, and 21–23), a full metal crown (#25), an 11-unit bridge (#35–46), and a removable partial denture (RPD) (#16, 17, 24, and 26) were placed.

6) Supportive periodontal therapy

At re-evaluation, inflammation showed a reduction, especially in the palatal and lingual regions (Fig. 6). A reduction in PD was observed in most teeth, but pockets with a PD

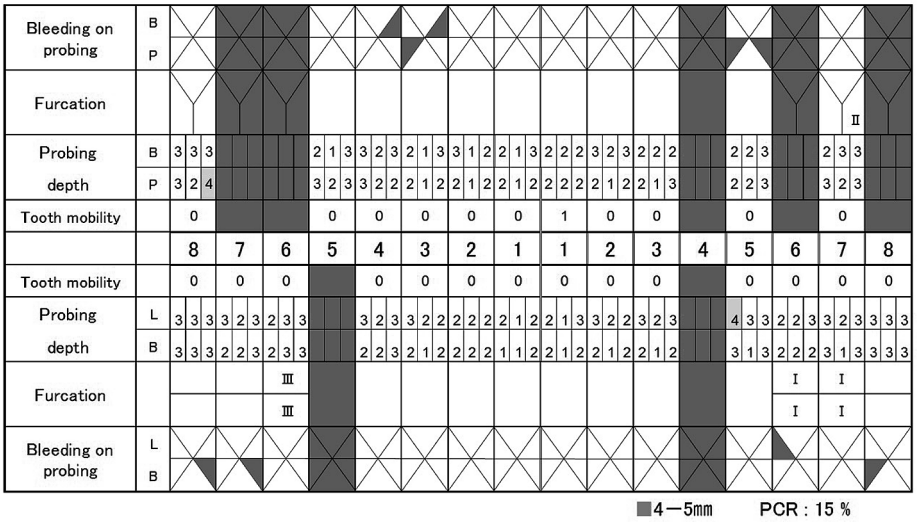

Fig. 7 Periodontal examination at start of SPT

Fig. 8 Radiographic view at start of SPT

of 4 mm were found in #18 and 35 (Fig. 7). An improvement in bone level was observed (Fig. 8). With leveling of the gingival margin and continued effort in self-care, the oral condition showed an improvement with good oral hygiene (PCR, 15%) and reduced gingival inflammation (BOP, 5%). The patient was placed in a recall system for SPT every 2 months.

During 2 years of SPT, the periodontal condition remained stable in most of the teeth. A 3-mm gain in clinical attachment was observed among the teeth treated with EMD (#14), with the position of these teeth eventually returning to normal due to changes in the mandibular dentition and lateral guidance. It is necessary to carefully monitor the teeth for mobility and an unfavorable crown-to-root ratio. Occlusion was frequently examined and the RPD adjusted to control occlusal trauma during SPT.

Discussion

The prognosis for the teeth in the present patient was either poor or hopeless due to advanced chronic periodontitis. A successful

outcome was achieved with periodontal surgery including regenerative therapy and the use of fixed and removable prostheses, allowing oral function to be restored. It has been reported that when periodontitis and occlusal trauma co-exist, a loss of attachment is likely to occur[3]. On the other hand, it has been suggested that while trauma superimposed upon existing intrabony pockets alters osseous morphology, it does not affect loss of connective tissue attachment[10]. In any case, occlusal consideration is necessary in the treatment of severe periodontitis. In the present case, initial periodontal therapy was implemented in order to eliminate or reduce etiological factors. In addition to inflammation control, occlusal adjustment was performed and a treatment denture and provisional restoration placed to minimize occlusal trauma. A series of periodontal surgeries including regenerative therapy were performed to further reduce periodontal pockets.

Before deciding on the course of prosthetic treatment, we carried out a review of the literature. During maintenance (mean 6.2 years) in 299 periodontal patients with various forms of fixed-bridge restoration, no significant difference was observed in periodontal condition between cross-arch and unilateral extension[7]. When 60 fixed bridges in patients treated for advanced periodontitis were investigated, all were found to have continued to function properly for 8–11 years, and the periodontal tissues around the abutment teeth showed no further loss of attachment[6]. In a follow-up of 43 cross-arch fixed partial dentures in patients with advanced periodontitis, a high rate of long-term (more than 10 years) successful outcome was found, provided adequate periodontal and prosthetic treatment and maintenance care were given[14]. These studies indicated the reliability of fixed-type restorations in patients treated for advanced periodontitis.

Information is limited with regard to the relationship between RPD and treatment outcome in periodontal patients. The prevalence of periodontal pockets exceeding 4–6 mm was reported to increase when RPD was used[13]. In another study, it was shown that RPD affected the health of the periodontium, and significant differences in clinical parameters between abutment and non-abutment teeth were reported[15]. It was also reported that RPDs are a risk factor for periodontal disease progression because of increased plaque accumulation associated with increased total IL-1β levels and impaired clinical periodontal parameters[5]. Collectively, these studies indicate that RPDs should be utilized with caution in prosthetic treatment for patients with periodontitis.

In the present case, it was not possible to use a fixed-type prosthesis in the maxilla due to the extent of bone loss. In Eichner's classification, loss of more than 2 out of 4 occlusal supports (B3) leads to further destruction of occlusion[2]. Therefore, an attempt was made to save the upper second molars with a poor prognosis in the present case. By placing a fixed mandibular prosthesis, it was possible to achieve mutually protected occlusion, which contributed to reducing occlusal stress in the maxillary molar regions.

The condition of the periodontal tissue remained stable throughout the 2-year SPT period. There are potential disadvantages in placing RPDs in periodontal patients. However, the present results indicate that successful long-term maintenance can still be achieved as long as prosthetic treatment is carefully planned and adequate checks on oral and denture hygiene are performed at recall appointments[1]. At present, the patient is on a 2-month recall schedule for SPT. It is, however, necessary to seek the optimal intervals for such recall appointments.

References

1) Bergman B, Hugoson A, Olsson CO (1982) Caries, periodontal and prosthetic findings in patients with removable partial dentures: A ten-year longitudinal study. J Prosthet Dent 48:506–514.
2) Eichner K (1990) Renewed examination of the group classification of partially edentulous arches by Eichner and application advises for

studies on morbidity statistics. Stomatol DDR 40:321–325. (in German)
3) Ericsson I, Lindhe J (1982) Effect of long-standing jiggling on experimental marginal periodontitis in the beagle dog. J Clin Periodontol 9:497–503.
4) Heitz-Mayfield LJA, Trombelli L, Heitz F, Needleman I, Moles D (2002) A systematic review of the effect of surgical debridement vs. non-surgical debridement for the treatment of chronic periodontitis. J Clin Periodontol 29:92–102.
5) Kurtiş B, Tüter G, Korkmaz T, Yücel A, Serdar M, Ozcan G (2003) Clinical examination and interleukin-1beta levels in gingival crevicular fluid in patients treated with removable partial dentures. Int J Prosthodont 16:59–63.
6) Nyman S, Ericsson I (1982) The capacity of reduced periodontal tissues to support fixed bridgework. J Clin Periodontol 9:409–414.
7) Nyman S, Lindhe J (1979) A longitudinal study of combined periodontal and prosthetic treatment of patients with advanced periodontal disease. J Periodontol 50:163–169.
8) Nyman S, Lindhe J (1989) Examination of patients with periodontal disease, Textbook of Clinical Periodontology, 2nd ed., pp.316–317, Munksgaard, Copenhagen.
9) O'Leary TJ, Drake RB, Naylor JE (1972) The plaque control record. J Periodontol 43:38.
10) Polson AM, Zander HA (1983) Effect of periodontal trauma on intrabony pockets. J Periodontol 54:586–591.
11) Socransky SS, Haffajee AD (1992) The bacterial etiology of destructive periodontal disease: current concepts. J Periodontol 63:322–331.
12) The American Academy of Periodontology (2001) Glossary of Periodontal Terms, 4th ed., p.35, The American Academy of Periodontology, Chicago.
13) Tuominen R, Ranta K, Paunio I (1989) Wearing of removable partial dentures in relation to periodontal pockets. J Oral Rehabil 16: 119–126.
14) Yi SW, Ericsson I, Carlsson GE, Wennström JL (1995) Long-term follow-up of cross-arch fixed partial dentures in patients with advanced periodontal destruction. Evaluation of the supporting tissues. Acta Odontol Scand 53: 242–248.
15) Zlatarić DK, Čelebić A, Valentić-Peruzović M (2002) The effect of removable partial dentures on periodontal health of abutment and non-abutment teeth. J Periodontol 73:137–144.

Reprint requests to:
Dr. Takashi Kinumatsu
Department of Periodontology,
Tokyo Dental College,
2-9-18 Misaki-cho, Chiyoda-ku,
Tokyo 101-0061, Japan
E-mail: kinumatu@tdc.ac.jp