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Abstract

We report a case of generalized aggressive periodontitis (AgP) requiring periodontal treatment including flap surgery and ridge augmentation. The patient was a 39-year-old woman who presented with the chief complaint of pus discharge from tooth #36. No other obvious signs of gingival inflammation were observed. Periodontal examination revealed multiple sites with a probing depth of ≥10 mm. Radiography showed pronounced bone defects in the maxillary incisors and molar region. Real-time PCR was used to detect Aggregatibacter actinomycetemcomitans, Porphyromonas gingivalis, and Tannerella forsythia in subgingival plaque; all 3 pathogens were found. Based on a clinical diagnosis of generalized AgP, periodontal therapy was initiated, which resulted in an improvement in clinical and microbiological parameters. A modified Widman flap procedure was then performed on sites with residual periodontal pockets. Next, a connective tissue graft was performed for ridge augmentation at #22, which had shown evidence of ridge resorption. Postoperative reevaluation revealed a reduction in probing depth and an improvement in marginal bone levels. Oral function was then restored using a fixed bridge prosthesis and maintenance therapy initiated. The periodontal condition has remained stable over a 2.5-year period. In the present case of AgP, surgical intervention reduced periodontal pockets and periodontal pathogens and improved the architecture of both the hard and soft tissues, allowing subsequent care of the periodontium to be performed efficiently by the patient.

Key words: Aggressive periodontitis — Initial periodontal therapy — Microbiological testing — Modified Widman procedure — Connective tissue graft
Introduction

The common features of aggressive periodontitis (AgP) are: 1) the patient is otherwise clinically healthy; 2) rapid attachment loss and bone destruction; and 3) familial aggregation. Some studies have suggested that pathogens such as Aggregatibacter actinomycetemcomitans and, to a lesser extent, Porphyromonas gingivalis are involved in the pathogenesis and progression of AgP. In addition to microbial pathogens, genetic polymorphisms may also play a role in the development of this disease, with complex interaction taking place with other genetic and environmental factors. It is therefore critical to take such risk factors into consideration when planning treatment for AgP; and any such plan will have to involve both the removal of the cause-related factors together with stabilization of occlusion. One important and common goal of periodontal treatment is to reestablish a healthy periodontium that can be properly maintained by patient self-care.

Here, we report a case of AgP requiring periodontal treatment including flap surgery and alveolar ridge augmentation using a connective tissue graft.

Case Presentation

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

1. Oral history

In February 2011, a 39-year-old woman was referred to us at the Department of Conservative Dentistry at the Tokyo Dental College Chiba Hospital by her local dentist with the chief complaint of pus discharge from tooth #36. She reported noticing mobility in #36 more than 10 years earlier, and had occasionally experienced swelling in the surrounding gingiva. In 2000, she also noticed increased mobility in #21 together with labial inclination of other front teeth. Tooth #21 had been extracted due to a trauma injury in 2008. She had not sought regular dental check-ups. In 2011, she experienced pain in #36, and her dentist referred her to our clinic for the potential extraction of the tooth together with a comprehensive periodontal examination.

2. Clinical assessment and diagnosis

The patient was systemically healthy and a non-smoker. Her father used a removable partial denture, but the reason for tooth extraction was unknown.

Figure 1 shows an oral view obtained at her first visit (baseline). A total of 26 teeth were present. Generally, although no marked evidence of gingival inflammation was present, discharge of pus from the periodontal pocket was observed in #36. The front teeth showed labial inclination. Her dental arch was V-shaped, and she presented open bite. No fremitus was observed in centric occlusion. Working movement to the right involved #13 and 16, while that to the left involved #23 and 33; no balancing contact was observed. Although tongue crenulations (scalloped borders) were observed, the patient was unaware of any tongue habits.

The results of the baseline periodontal examination are shown in Fig. 2. Mean probing depth (PD) was 3.9 mm, with a maximum value of 12 mm. Forty-nine out of 156 sites (31%) had a PD of ≥4 mm and 20 sites (13%) a PD of ≥7 mm. The level of plaque control as assessed by the O’Leary plaque control record (PCR) was 58%. She brushed her teeth twice a day, but her interest level toward oral health appeared to be low.

Radiographic examination at baseline (Fig. 3) revealed angular bony defects in #16, 22, 25, 26, 36, 37, and 46. Periapical radiolucency at #16 suggested a perio-endo lesion. However, the result of electric pulp testing was positive. Tooth #16 had degree 1 furcation involvement in the distal area, while that in #36 was degree 2 in the buccal area.

Microbiological assessment of subgingival plaque was carried out as described previously. A sample of subgingival plaque was obtained from the site with the deepest PD (bucco-mesial site in #36). After carefully
removing the supragingival plaque with sterilized cotton pellets, two sterile paper points were inserted into the deepest area of the pocket for 30 sec. The sample was then immediately transferred into a tube supplied in a commercial kit (Saliva-Check Lab, GC, Tokyo, Japan) and sent to a microbiological testing laboratory (GC Oral Check Center, Tokyo, Japan) for real-time PCR analysis of \textit{A. actinomyctemcomitans}, \textit{P. gingivalis} and \textit{Tannerella}
The results of the microbiological assessment are shown in Fig. 4. Total bacterial counts (copies) were $1.5 \times 10^7$. The number of copies (proportions within the total bacterial counts) for *A. actinomycetemcomitans*, *P. gingivalis* and *T. forsythia* were $7.7 \times 10^3$ (0.05%), $2.4 \times 10^6$ (16%), and $9.5 \times 10^4$ (0.6%), respectively.

A clinical diagnosis of generalized AgP was made according to the classification of the American Academy of Periodontology.

3. Prognosis and treatment planning

1) Prognosis

Due to the presence of furcation involvement and tooth motility, the prognosis for #36 was determined to be ‘hopeless’ and that for #16 ‘poor’. Due to the presence of deep intrabony defects, the prognosis for #26 and 27 was ‘poor’. Because of its single-root morphology and absence of mobility, the prognosis for #22 was ‘guarded’.

2) Treatment planning

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

(1) Initial periodontal therapy

This comprised oral hygiene instruction, quadrant scaling and root planing (SRP), extraction of #36, control of potential tongue thrusting, endodontic treatment, and placement of provisional restorations (#16, 11–22, 35, and 36).
(2) Reevaluation
   Periodontal and microbiological examinations

(3) Periodontal surgery
   Modified Widman flap procedure for sites
   with a PD of $\geq 4$ mm

(4) Reevaluation
   Periodontal and microbiological examinations

(5) Treatment for recovery of oral function

(6) Supportive periodontal therapy or maintenance

### Clinical Procedures and Outcomes

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

1) Initial periodontal therapy
   After establishing the appropriate level of plaque control, quadrant-based SRP was performed. Behavioral cognitive therapy was used to reduce habitual tongue thrusting. It had been decided initially to extract #36 as the prognosis was ‘hopeless’. However, this plan was later abandoned in favor of saving the distal root. Therefore, hemisection of the mesial root was performed at this stage. The reevaluation revealed a decrease to 13 and 4% for sites with a PD of $\geq 4$ and $\geq 7$ mm, respectively. The 3 periodontal pathogens targeted were no longer detected (Fig. 4).

2) Periodontal surgery
   A Widman flap procedure was selected for sites with residual periodontal pockets (Figs. 5A–D). Here, a bone defect exceeding the root apex was found in #16 intraoperatively, necessitating subsequent trisection of the palatal root. Flap surgery was also performed on #46 and 47. A provisional restoration (1-unit bridge type) was placed on #16–23. These surgical interventions resulted in a reduction in periodontal pockets and an improvement in the marginal bone levels.

Tooth #22 was extracted because it frequently showed acute symptoms during initial periodontal therapy, which indicated that it would be unsuitable as an abutment tooth for the planned prosthesis. A class III ridge deformity according to the Seibert classification became apparent at 6 months after extrac-
Therefore, ridge augmentation was performed using a connective tissue graft (Figs. 5E–H), the tissue for which was harvested from the left palatal area.

3) Treatment for recovery of oral function

Postoperative reevaluation revealed no sites with a PD of ≥4 mm and an improvement in marginal bone levels. A pulpectomy had to be performed on #12 and 15 due to postoperative hypersensitivity and problems with abutment parallelism. Subsequently, final prostheses were placed on #35, 36, and 16–23 (fixed bridge). Group function was tested after placement of a provisional restoration to clarify occlusal contact. No problems were identified with occlusal guidance, so this was adopted in the final restorations as well.

4) Maintenance therapy

After reevaluation, maintenance therapy was initiated. Oral photographs, the results of periodontal examination, and radiographs at 2.5 years of maintenance are shown in Figs. 6–8. So far, the condition of the periodontium has remained stable.

Discussion

On presenting at our clinic, the patient was 39 years old, and had initially noticed mobility in the front teeth more than 10 years earlier, indicating that periodontal breakdown had started when she was in her early 20’s. Periodontal destruction was observed around a total of 13 teeth, and involved more than two teeth other than first molars or incisors, leading to a clinical diagnosis of generalized AgP. The PCR score was 58%, which was somewhat higher than the mean score of 49% observed in patients visiting our hospital. The main etiologies other than plaque were calculus, parafunction, and malocclusion, and the treatment plan was focused on early removal of those factors.

Evaluation of initial periodontal therapy according to predetermined criteria for successful non-surgical therapy revealed that it had been incomplete. Therefore, the decision was taken to perform a modified Widman flap procedure to further reduce residual periodontal pockets.

An increase in bone resorption and attachment loss on reevaluation necessitated extraction of #22. A slight decrease in the vertical dimension of occlusion due to the placement of provisional restorations in the molar region may have induced occlusal trauma to the tooth. The extraction of #22 resulted in alveolar ridge resorption, which had the potential to compromise plaque control around the pontic area after placement of the final prosthesis. Furthermore, this also posed a risk in terms of compromised esthetics. Therefore, ridge augmentation was performed using a connective tissue graft. Inlay graft technique was selected in order to increase the
dimensions of both the horizontal and vertical soft tissues without affecting the muco-gingival junction. Ridge augmentation yielded favorable soft tissue architecture for the pontic placement.

The prognosis for #16 was ‘poor’, and trisection of the palatal root was performed here. It has been reported that the 10-year survival rate after root resective therapy in molars with furcation involvement was 93%, and that periapical lesion was the most prevalent cause for tooth loss. In the present case, root canal treatment for #16 was performed under a rubber dam to minimize the risk of

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Fig. 6  Oral view at 2.5 years during maintenance

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Fig. 7  Periodontal examination at 2.5 years during maintenance

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root canal infection. No hypermobility was observed in #16, and cleansability was tested with a provisional restoration. The tooth was then included in the periodontal prosthesis.

Microbiological involvement has been reported in the development of AgP for over 30 years, with *A. actinomycetemcomitans* being identified as the prime suspect. However, the diagnostic value of microbiologic tests in discriminating certain forms of periodontitis has been questioned. Nevertheless, monitoring specific periodontal pathogens is still believed to be important in periodontal therapy. In previous reports from our department, AgP was successfully treated with or without adjunctive antimicrobial therapy. In the present case, no antimicrobial therapy was implemented prior to periodontal surgery, and no *A. actinomycetemcomitans, P. gingivalis, or T. forsythia* was detected after. Periodontal pathogens have been reported to re-emerge, triggering recurrence of periodontitis. Cugini *et al.* reported that regular periodontal maintenance yielded favorable results microbiologically, indicating the importance of continued monitoring for periodontal pathogens.

There were limitations in the microbiological assessment in this case report. First, sampling was performed at only one site, which cannot therefore be taken to offer a representative subgingival microbiological profile of the whole mouth. Second, the initial sampling site, the bucco-mesial area of the mesial root of #36, had to be changed to the bucco-mesial area of the distal root, due to extraction of the mesial root. Currently, however, a pooled method is favored at our clinic, obtaining samples from multiple sites but excluding those where the prognosis is hopeless.

The patient's level of plaque control was good (PCR <20%) at the start of maintenance therapy. Surgical intervention improved the architecture of both the hard and soft tissues, allowing the condition of the periodontium to subsequently be maintained efficiently by the patient. The risk at the maintenance phase was determined to be low according to the Periodontal Risk Assessment. However, a marked change was observed in occlusal contact and guidance after therapy. Given this situation and patient preference, the recall interval was set at 3 months. So far, the periodontal condition has remained stable, and monitoring is scheduled to continue.

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References


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