Nonsurgical periodontal therapy to treat a case of severe periodontitis

A 12-year follow-up

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ABSTRACT

Background and Overview. This case report describes the successful treatment of a severe chronic periodontitis case by nonsurgical therapy and a strict maintenance program over a 12-year period.

Case Description. A 38-year-old man concerned about the protrusion of his maxillary incisors was referred for periodontal treatment. The teeth in the maxillary arch had generalized severe chronic periodontitis. Several treatment options were presented to the patient including the most aggressive, extraction of all maxillary teeth, and the most conservative, scaling and root planing. The patient opted to having the most conservative approach, even though the prognoses for the maxillary teeth were unfavorable. Therefore, he received nonsurgical therapy via scaling and root planing combined with systemic antibiotics before referral to an orthodontist to address the esthetic concerns. The maxillary dentition was treated with orthodontic therapy to retract and align the maxillary anterior segment. Periodontal maintenance (1-hour session), including subgingival instrumentation, was performed 4 times per year until the end of the 12-year follow-up period. The patient only missed 2 appointments in 12 years. Twelve years later, the results revealed that all but 1 maxillary tooth were maintained in a state of acceptable health, function, and esthetics.

Conclusions and Practical Implications. Although most would agree with the initial poor prognosis of this patient's case, nonsurgical periodontal therapy was utilized with a 3-month periodontal maintenance program and demonstrated long-term success. The outcome presented in this case report may only have been possible because of patient compliance, professional experience, skill, and supervision throughout the course of treatment.

Key Words. Generalized severe chronic periodontitis; nonsurgical therapy; periodontal maintenance; orthodontics.

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Periodontitis is an inflammatory condition of the supporting structures of the teeth that affects 47% of adults over the age of 30 years.[1] The high prevalence of periodontitis should be of concern because if untreated, it may result in tooth loss.[2] The tissue destruction caused by periodontitis can result in compromised masticatory function, impaired speech, and adverse esthetic problems, which can worsen a patient's quality of life.[3]

Orthodontic treatment in adults is now a common modality of therapy to improve esthetics and function. As the incidence of periodontitis increases with age, the number of adult patients who are in need of corrective tooth movement—who also have a periodontal problem—is increasing.[4] Fortunately, a reduced periodontium is not a contraindication for orthodontic treatment.[5-7] To perform orthodontic therapy without further periodontal damage, periodontal health must the attained before tooth movement is initiated. Moreover, the periodontally healthy dentition should be maintained with a 3-month periodontal maintenance interval and excellent plaque control during the course of orthodontic therapy[8,9]; if the oral hygiene is

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not excellent to good, orthodontic treatment should be terminated.[10]

This patient's case report describes the successful interdisciplinary treatment of a patient with severe chronic periodontitis who sought care for a buccal flare of his maxillary anterior teeth. Treatment involved nonsurgical periodontal therapy followed by orthodontic treatment.

The combined periodontal and orthodontic therapy provided the patient with stability for 12 years, with respect to tooth retention, periodontal health, function, and esthetics.

CASE PRESENTATION

A 38-year-old nonsmoking man, in good general health, was evaluated at the author's (J.C.) private practice for periodontal therapy. The patient denied having diabetes; unfortunately, laboratory tests, such as hemoglobin A_{1c} levels, were not performed to rule out diabetes. The patient's main concern was summarized by his explanation that the "upper anterior teeth have moved out of place," which compromised his dental esthetics over the last 5 years. The maxillary tooth movement was a result of periodontitis. No contraindications to dental treatment and periodontal therapy were identified.

At the initial examination (Figure 1), significant gingival recession was seen along with extensive supra- and subgingival calculus in the maxillary arch. Pocket depths (PD) were deep around most maxillary teeth (Table). Radiographic examination of the maxillary teeth showed at least 70% bone loss on most teeth. In spite of the severe attachment and bone loss, tooth mobility did not exceed Miller Class I[11] (data not shown). Teeth nos. 3 and 14 had Class III furcation involvement. Teeth nos. 3, 4, 5, 7, 8, 9, 10, and 14 were initially assigned a hopeless periodontal prognosis.[12] Tooth no. 14 had an initial furcation cavity. Teeth nos. 6, 12, 13, and 16 were assigned a questionable prognosis, as they had lost at least one-third of their bone support and had initial mobility. Only teeth nos. 1, 2, 11, and 15 were periodontally stable and assigned a fair prognosis (expected to survive $\geq$ 5 years). All mandibular teeth were assigned a fair/good prognosis.

The following characteristics were considered positive prognostic factors for tooth retention:

- limited tooth mobility;
- nonsmoking patient;
- high motivation for dental care;
- excellent oral hygiene.

An initial diagnosis of generalized aggressive periodontitis[13] was contemplated due to the low plaque index score (15%)[14] associated with the amount of radiographic bone loss. However, a nonprescribed use of chlorhexidine mouthwash was likely the reason for the low plaque index. Also, the amount of subgingival calculus associated with virtually no mandibular bone loss corroborated with the chronic periodontitis diagnosis.[13]

A diagnosis of generalized severe chronic periodontitis[13] was made for the maxillary arch, whereas the mandibular arch received a diagnosis of generalized mild to moderate chronic periodontitis. Tooth no. 30 was lost due to a vertical fracture and tooth no. 17 was surgically extracted several years before periodontal treatment.

From an orthodontic perspective, the patient had proclined and protruded maxillary teeth, a Class I molar relationship on the left side, and a posterior crossbite on the right side. The maxillary midline was shifted to the left. The patient had the parafunction of clenching and grinding.

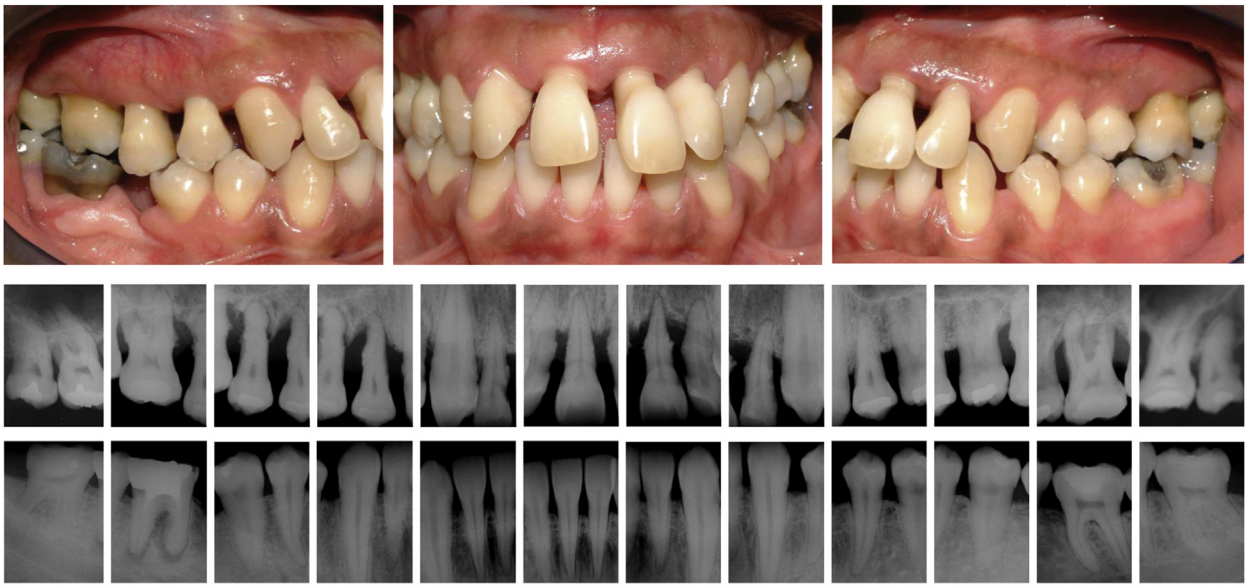
Periodontal treatment. Four treatment options were plausible in this case. The initial option consisted of extraction of all or most maxillary teeth and replacement with a full or partial removable prosthesis. Another option consisted of extraction of all maxillary teeth with the placement of implants for fixed or removable support. In addition, yet another option involved an attempt to save all the maxillary teeth through a surgical regenerative therapy. A final option was the combination of nonsurgical therapy, and possibly orthodontic treatment, which would need to be followed by a 3-month maintenance care program.

The patient was informed that the latter option would be performed without the treating dentist's ability to predict tooth longevity, as several teeth had been assigned a poor or hopeless prognosis. The patient understood the options and made an informed decision to attempt to maintain his natural dentition. He justified his choice based on his age and comfort, which eliminated the utilization of full removable prosthesis, periodontal regenerative materials, or implants as treatment options.

Periodontal treatment was initiated via professional supragingival biofilm control and oral hygiene instructions, followed by a 30-day daily rinsing regimen with chlorhexidine 0.12% solution 2 times per day. During this 30-day interval the patient came in for 4 appointments: 1 60-minute session of supragingival instrumentation with an ultrasonic device in both arches, and subsequently 3 1-hour sessions of subgingival instrumentation via scaling and root planing (SRP) with hand instruments and under anesthetic in the maxillary arch. All 4 appointments were completed in 1-week intervals. No occlusal adjustment was performed.

Eight weeks after SRP was concluded, the re-evaluation clinical data showed a reduction in PD and bleeding on

ABBREVIATION KEY. **BOP:** Bleeding on probing. **PD:** Pocket depths. **SRP:** Scaling and root planing.



	1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16		
B	3	2	3	3	2	5	**7**	2	**9**	**7**	1	**7**	10	5	10	5	2	2	2	2	**7**	**8**	2	**7**	**7**	2	**7**	**8**	1	5	4	2	2	2	2	3	3	2	3	**10**	**5**	**7**	3	1	3	**4**	**5**	**6**
P	3	3	3	3	2	3	6	1	9	6	5	9	**10**	**6**	**10**	**5**	4	**5**	5	**5**	6	6	6	**5**	**6**	**8**	**9**	**7**	**6**	**5**	3	2	2	3	2	3	4	2	4	**10**	**3**	**6**	3	2	3	**4**	3	3

Figure 1. Clinical photographs, radiographs, and probing depth measurements at baseline. Alveolar bone levels were dramatically different on the maxillary and mandibular arches. A bold and underlined number denotes bleeding on probing. B: Buccal. P: Palatal.

probing (BOP) in both arches. Tooth mobility was no longer seen in the posterior arch with Class I mobility in the maxillary anterior segment. The patient's masticatory function was normal. Nevertheless, teeth nos. 9 and 10 were splinted with bonded resin to avoid additional trauma and luxation during mastication. The sites found to have PD 4 millimeters or greater and BOP were retreated by SRP with both hand and ultrasonic instrumentation. Systemic antimicrobial therapy was prescribed using doxycycline 100 milligrams every 12 hours for 15 days.[15]

After initial therapy, a strict 3-month maintenance program was instituted with the patient returning for recalls every 3 months. The patient only missed 2 periodontal maintenance visits in 12 years. During the maintenance phase, a biofilm disclosing agent (2% fuchsine) was utilized to evaluate supragingival biofilm control and ultrasonic/manual instruments were used for subgingival instrumentation (pockets > 3 mm).

Periodontal results. One year after phase I therapy, the patient's maxillary periodontal condition was re-evaluated and showed drastic improvement (Figure 2). The number of pockets probing between 1 mm and 4 mm increased from 50 to 77 sites (54% increase). The number of pockets between 5 mm and 6 mm decreased from 21 to 7 pockets (62% decrease). The number of PDs greater than 7 mm went from 19 to 5 (55% decrease) (Table). In addition, the number of sites with BOP decreased from 31 to 4 (87% decrease) (Table).

TABLE

Maxillary pocket depth (number and relative proportion of sites) and bleeding on probing at various time points.

VARIABLE	BASELINE	1 YEAR	6 YEARS	12 YEARS
Pocket Depth, Sites (No.)				
1-4 mm*	50	77	74	76
5-6 mm	21	8	14	14
≥ 7 mm	19	5	2	0
Total sites	90	90	90	90
Pocket Depth, Sites (%)				
1-4 mm	55.6	85.6	82.2	84.4
5-6 mm	23.3	8.9	15.6	15.6
≥ 7 mm	21.1	5.6	2.2	0.0
Bleeding on Probing				
Sites (no.)	31	4	4	4
Sites (%)	34.44	4.44	4.44	4.44

* mm: Millimeters.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
B	3 2 2	3 2 3	8 **7** 6	5 1 **5**	5 2 6	2 2 2	2 2 3	3 1 3	4 2 3	4 2 2	2 2 2	2 2 3	3 1 2	8 **7** 8	3 2 2	2 2 3
P	4 5 3	4 3 4	7 2 **9**	4 2 3	4 2 9	3 2 2	2 2 2	3 2 3	3 2 4	3 2 3	3 2 2	4 2 4	4 2 2	7 2 8	2 2 2	3 **5** 5

Figure 2. Clinical photographs, radiographs, and probing depth measurements at 1 year postperiodontal therapy. A bold and underlined number denotes bleeding on probing. B: Buccal. P: Palatal.

Three years after phase I therapy, the clinical attachment (data not shown) and bone levels showed no further deterioration, and the maxillary teeth were considered stable. Tooth no. 14 was lost due to furcation caries 3 years after initiation of therapy and consequently not considered in our data analysis.

At this time, the patient was referred for an orthodontic consultation and possible treatment.

Orthodontic treatment. Before the initiation of orthodontic treatment, tooth no. 14 was extracted due to caries involving the furcation area, and the anterior resin splint in teeth nos. 8 and 9 was removed. The orthodontic treatment was accomplished using the edgewise technique over a period of 3 years.[16] Steel wires were used due to a large occlusal plane discrepancy. Initially, the anterior teeth were intruded individually to avoid premature vertical contacts. The teeth adjacent to the teeth being intruded received stainless steel anchor bands. Temporary anchorage devices were used to intrude the posterior teeth. The intrusion criterion used was continued on teeth that had the heaviest contact with force of 10 grams per tooth, slow and continuous. A transpalatal arch was used to assist with the intrusion of molars to prevent buccal and lingual tipping. The same device was also helpful during the intrusion of the premolars to avoid extrusion of the molars. The Aqualizer (Jumar) appliance was utilized during the entire treatment to protect teeth against parafunction. At the end of the treatment, the patient received a conventional mandibular canine-to-canine fixed retainer, a maxillary Hawley retainer for daytime use, and a Michigan splint for nighttime wear.

FINAL RESULTS

The orthodontic treatment combined with the placement of veneer restorations on the maxillary anterior teeth addressed the patient's esthetic concerns by reducing buccal flare, excessive gingival display, and decreasing the interdental spaces between teeth. The right side crossbite was corrected and the occlusion became protected with appropriate contacts between posterior teeth, canine guidance for lateral mandibular movements, and anterior guidance in protrusion (Figure 3).

The periodontal treatment resulted in a decrease in PD and BOP during the first year. During the subsequent years, these parameters were maintained through orthodontic treatment and remained stable until the end of the 12-year follow-up period (Table and Figure 4). No additional bone loss was detected. The patient was satisfied with the overall treatment outcome.

DISCUSSION

With long-term follow-up on our patient's dental health, we found that nonsurgical therapy was successfully utilized to treat severe periodontitis. However, the patient's motivation to maintain good oral hygiene and to adhere to a 3-month periodontal maintenance program appeared to be essential components of the success we observed in this case.

At the initial consult, the patient was given 4 options that ranged from full mandibular arch extractions and rehabilitation to a conservative approach that attempted to save the maxillary dentition.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
B	3 2 2	2 2 2	3 6 6	**5** 1 4	**5** 2 4	4 2 2	2 2 2	5 3 4	5 3 5	3 2 3	2 2 3	3 2 3	3 2 2		3 2 2	3 3 4
P	4 4 3	2 2 4	**8** 2 **6**	5 3 5	4 2 6	3 3 3	3 3 4	5 3 4	4 3 2	2 3 7	3 3 3	3 3 5	3 3 3		4 2 2	3 3 5

Figure 3. Clinical photograph and probing depth measurements at 6 years postperiodontal therapy. Orthodontic treatment was performed between years 3 and 6 after periodontal therapy. A bold and underlined number denotes bleeding on probing. B: Buccal. P: Palatal.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
B	3 2 2	2 3 2	2 5 5	3 1 5	5 2 4	4 1 3	3 2 3	4 2 4	**5** 3 5	4 2 4	3 2 2	3 2 2	3 2 2		3 2 2	4 2 3
P	4 4 4	4 2 **5**	**5** 2 5	5 2 4	4 2 5	4 4 4	3 3 4	4 3 4	5 4 5	3 3 **5**	3 2 3	3 2 4	4 2 3		3 2 3	3 3 3

Figure 4. Clinical photographs, radiographs, and probing depth measurements at 12 years postperiodontal therapy. A bold and underlined number denotes bleeding on probing. B: Buccal. P: Palatal.

One treatment option for full or partial edentulation was with tooth replacement with a maxillary removable prosthesis. This was a reasonable option with good long-term prognosis. However, the patient did not want this option, given his age and his feelings concerning the idea of wearing removable prosthesis.

Another treatment option was an implant-supported prosthesis. This would have been a challenge, given the reduced vertical and horizontal bone height for implant fixture delivery. In addition, patients who have a history of periodontitis are also more likely to develop peri-implantitis, which occurs in 11% to 47% of the implants placed.[17,18] Moreover, it has been shown that 40% of those who receive implants will have some form of complication in the first 10 years after their placement.[19-22]

The final option would be to attempt a regenerative procedure, which was not out of the question. However, periodontal regenerative procedures require a specific type of defect morphology and it would be an extensive procedure to attempt success.[23-25]

Given the patient's young age (38 years), and the facts mentioned above, it was felt that it would be in the patient's best interest to attempt to postpone tooth

extraction for as long as possible. In addition, if the periodontal disease were stabilized, the patient would then undergo orthodontic treatment to address his main concern of esthetics. It is well documented that further periodontal breakdown, and even tooth loss, can occur during orthodontic treatment if the patient is not periodontally stable.[7] Nonetheless, it is also well documented that the combination of periodontal and orthodontic therapies has been shown to be effective in restoring compromised dentitions, aiding in the resolution of bony defects, and improving esthetics.[8,26]

This case report, with a 12-year follow-up, corroborates existing evidence that even dentitions with severely reduced periodontal support can be successfully retained and maintained, and further breakdown may be prevented during and after additional orthodontic therapy. It should be once again emphasized that patient motivation, meticulous home care, and a 3-month periodontal maintenance program are primary determinants of treatment success. These factors must be achieved and maintained on an indefinite basis to avoid periodontitis recurrence and progression, therefore avoiding the need for tooth extraction.[8,9,27] Moreover, Machen[10] suggested that if good oral hygiene is not maintained, orthodontic treatment should be terminated. It is important to note that this patient adhered to the recommended recall schedule in which he received periodontal support therapy every 3 months, missing only 2 appointments during the 12-year follow-up. Even if it is assumed that this patient will eventually need tooth replacement via implant-supported restorations, simply extending the longevity of the natural dentition would improve the prognosis of the eventually placed implants by the fact that they would need to last a shorter period of time within the context of the patient's life span.[28]

The modality of periodontal therapy adopted to treat this patient was nonsurgical. Both nonsurgical and surgical procedures can be effective in removing subgingival deposits.[6,29] The decision to use nonsurgical therapy was based on multiple factors. Initially, closed SRP should always be performed before periodontal surgery, because it might suffice in achieving a maintainable periodontium and because it limits the extent, time, and degree of difficulty of surgical procedures, should they become necessary.[30] In addition, nonsurgical therapy has been shown to preserve greater amounts of soft tissue around teeth, and as a consequence, allows more fibers to embrace the tooth (that is, circular fibers), helping stabilize the dentition after healing.[31] Another factor is that the clinical attachment gain that results from the formation of a long-junctional epithelium enables a larger amount of soft tissue to remain in the area around the teeth, providing an added natural barrier for the spread of inflammatory changes onto the periodontal ligament and alveolar bone.[32] Finally, nonsurgical periodontal therapy causes less gingival recession than surgical therapy and, therefore, preserves esthetics, which was a concern for this patient.[33]

Avoiding surgical therapy, however, is dependent on PD as it determines accessibility for biofilm control and subgingival professional debridement, and the presence of inflammatory changes (BOP).

Three years after active periodontal treatment, the patient underwent orthodontic treatment. The lengthy orthodontic treatment, which included slow tooth movement via light forces, was justified by the initial periodontal status in the maxillary dentition and the risk of additional periodontal breakdown.

This case report supports the established concept that orthodontic therapy can be successfully performed on patients with a reduced but stable periodontium. With good oral hygiene and proper periodontal maintenance, orthodontic treatment does not have a detrimental effect on the supporting structures of the teeth.[34]

CONCLUSION

This patient's case report demonstrates that severe periodontitis can be successfully arrested by nonsurgical therapy. Teeth with a healthy but reduced periodontium can be orthodontically moved and the progression of periodontitis may not occur from orthodontic movement, provided that the patient maintains good home care and follows a strict periodontal maintenance program. ■

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