

CASE REPORT

Saving teeth: Revisited. Esthetic improvement and long-term periodontal stability of a pathologic tooth migration case: An 84-month follow-up

Aikaterini Georgantza¹ | Maryse Manasse¹ | Rogerio Tupinambá² |
Celestino Nobrega³ | Steven Pigliacelli⁴ | Yung Cheng Paul Yu¹ | [Jason Starace¹](#) |
Leena Palomo¹

¹Ashman Department of Periodontology and Implant Dentistry, New York University College of Dentistry, New York, New York, USA

²Private Practice, Ortogeo, São José dos Campos, Brazil

³Department of Orthodontics, Case Western Reserve University, Cleveland, Ohio, USA

⁴Department of Prosthodontics, New York University College of Dentistry, New York, New York, USA

Correspondence

Aikaterini Georgantza, Ashman Department of Periodontology and Implant Dentistry, New York University College of Dentistry, 345 East 24th Street, New York, NY 10010, USA.
Email: ag4222@nyu.edu

Abstract

Introduction: Advances in [implant dentistry](#), often influence our clinical treatment planning and steer us as periodontists from our fundamental values of preserving teeth. Pathologic tooth migration (PTM) of maxillary anterior teeth is a common sequela of periodontitis in patients and results in significant esthetic and functional problems. Patients' growing concern about the esthetics of their teeth and their fears of losing teeth are often reasons for them to seek treatment. We commonly assign a hopeless prognosis to these pathologically migrated teeth because of the significant loss of periodontal support and go with the "safer" choice of replacing them with implants. The purpose of this case report is to present the long-term (7-year) periodontal stability of compromised teeth and to emphasize the successful outcomes achieved when orthodontics, non-surgical periodontal, and restorative treatments are combined.

Case Presentation: A 38-year-old, otherwise healthy male with compromised function and esthetics, PTM, periodontal disease, and missing teeth presented to our clinic. Primary treatment objectives were to 1) eliminate the periodontal inflammation and 2) restore and stabilize the occlusion by employing non-surgical periodontal treatment, adult orthodontics, and prosthodontics. Following interdisciplinary treatment, clinical and radiographic re-evaluation revealed significant clinical attachment gain, reduction in tooth mobility, favorable esthetics, and better overall prognosis. At an 84-month follow-up, the patient was periodontally healthy and retained his natural dentition.

Conclusions: Interdisciplinary collaboration along with patient compliance may increase the longevity of periodontally compromised teeth and improve esthetics for periodontitis patients who suffer from PTM. Such long-term favorable outcomes reaffirm the value of classic periodontal treatment and the success of multidisciplinary treatment to save teeth as a viable alternative to the extraction of teeth and the placement of implant retained restorations.

KEY WORDS

pathologic tooth migration, esthetics, periodontics, orthodontics, prognosis, treatment-planning



FIGURE 1 Pre-treatment extra-oral photograph.



FIGURE 2 Pre-treatment intra-oral photograph. Frontal view.

BACKGROUND

Pathologic tooth migration (PTM) is the movement of a tooth out of its former position resulting from the etiologies associated with a disease process.¹ It is of particular concern given its high prevalence of 30.03%-55.8%.² Patients with PTM seek solutions, concerned with esthetic and functional problems.

PTM results primarily from periodontal bone loss and intraoral forces that originate from the lips, cheeks, and tongue as well as occlusal and eruptive forces, parafunctional habits, and inflammation.^{2,3} Loss of bone height reportedly leads to mobility and a worse prognosis for the affected teeth. However, based on findings by McGuire

and Nunn initial prognosis of “less than good” has limited predictive value and there is no reported relationship between hypermobility and a worsening prognosis over 8 years. According to the authors, there appears to be limited evidence that clinicians can accurately predict tooth loss based on hypermobility.⁴ Due to the limitations of the existing prognostication systems, the case presented highlights a dilemma commonly faced by clinicians when treatment planning: extract or save periodontally compromised teeth. A successful long-term outcome may be achieved when making the decision to maintain teeth with interdisciplinary management, supportive periodontal care (SPC), and patient compliance.

CLINICAL PRESENTATION

A 38-year-old male who reported no significant medical history and no history of smoking, presented to the Department of Periodontology and Implant Dentistry at New York University

College of Dentistry on January 11, 2016, with the chief complaint, “I want to fix my shifted teeth” (Figure 1). Written informed consent was obtained.

Clinical and radiographic examination revealed generalized horizontal bone loss, irregular positioning of #6-11 and 20, plaque score of 100%, bleeding on probing (BOP) at 80%, and missing #4, 12, 13, and 19 (Figures 2 and 3). Periodontal probing depths (PPD) ranged from 2-8 mm and maxillary anterior teeth presented with mobility, Grade 2 #7 and 11 and Grade 3 #8, 9, and 10.⁵ Detailed periodontal measurements are shown in Figure 4.

The initial cephalometric records revealed a Class I maxillary relation, hypo-divergent facial pattern, and maxillary biprotrusion. The maxillary incisors presented with proclination and protrusion and the mandibular incisors protruded with normal inclination (Figure 5).

The patient was given the following diagnoses: generalized Stage III, Grade C periodontitis, PTM, and secondary occlusal trauma due to the reduced periodontium.

The prognosis of the mandibular teeth was good and a questionable prognosis was given for all maxillary teeth

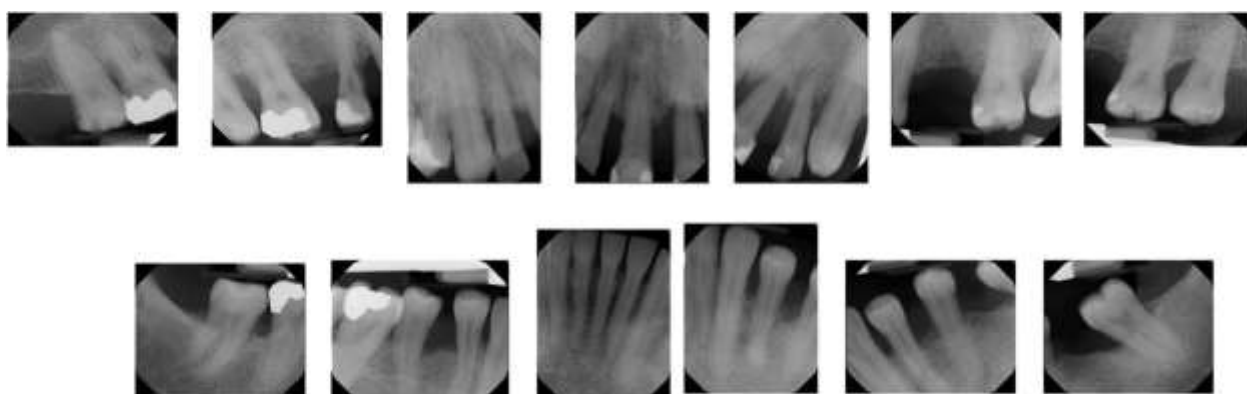


FIGURE 3 Pre-treatment full mouth radiographs demonstrating moderate to severe destruction of the alveolar bone, especially in the maxillary anterior region.

PERIODONTAL CHART

Date 01/11/2016

Patient Last Name [REDACTED]

First Name [REDACTED]

Date Of Birth [REDACTED]

☒ Initial Exam☐ Reevaluation

Clinician AG

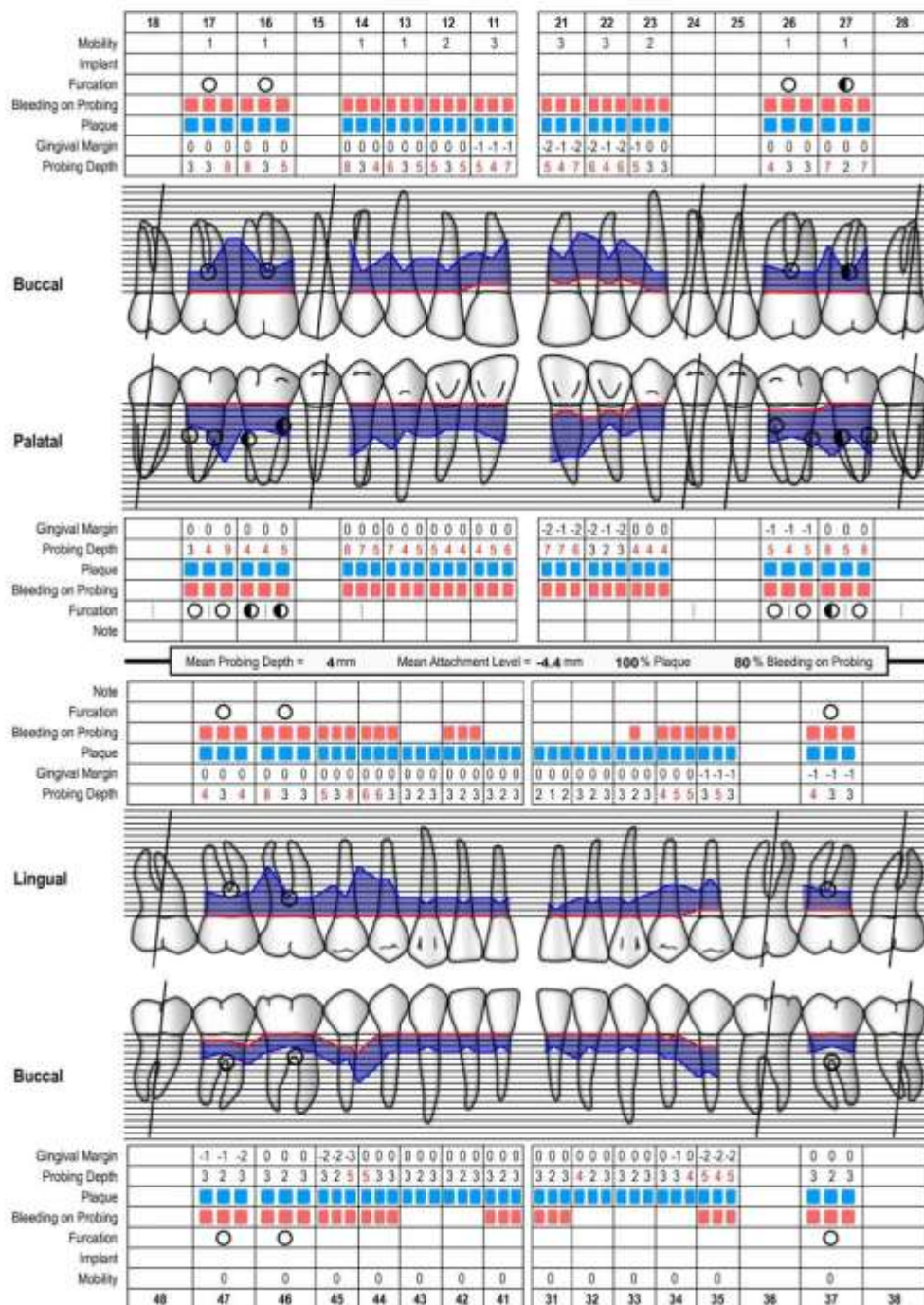


FIGURE 4 Pretreatment periodontal charting (January 11, 2016).

except for #8, 9, and 10 which were hopeless.⁴ The patient was informed of the periodontal diagnoses, including causes of the condition, risk factors, and the unfavorable prognosis of his maxillary anterior teeth. Upon orthodontic and prosthodontic consultations, three treatment options

were presented with expected risks and benefits including treatment goals (Tables 1 and 2). The patient was adamant about keeping his teeth and opted for treatment option 3, knowing that options 1 and 2 will still be available in the future if the affected teeth cannot be maintained.



FIGURE 5 Lateral cephalometric tracing at baseline.

TABLE 1 Problems and treatment goals

Problems	Treatment goals
Extraoral	
Lower lip tension to maintain closure	Normalization of overbite and overjet
Function	
Compromised function due to lack of mutually protected occlusion and lack of guidance	Proper torque expression, restore and stabilize the occlusion
Intraoral	
Advanced periodontal disease 40%-70% bone loss of the maxillary anterior teeth	Stabilize/control the inflammatory periodontal disease with periodontal therapy and strict maintenance
Compromised esthetics	Restore unbalanced incisor relationship, restore guidance and esthetics with Orthodontic treatment: Proper torque expression, retraction, and space closure
Irregular overjet, lack of proper overbite and large diastemata, flaring of maxillary anterior teeth, extrusion of #8 and 9, deficient edentulous alveolar ridge, missing teeth #4, 12, 13, and 19, and defective restorations	Ridge augmentation Restore missing teeth Replace defective restorations

*Prognosis: Depending on the periodontal health and the maintenance of the retainer.

CASE MANAGEMENT

The first step in periodontal therapy was aimed at guiding behavioral change by motivating and teaching the patient to successfully remove supragingival dental biofilm

TABLE 2
Treatment options

	Treatment option 1	Treatment option 2	Treatment option 3
Phase 1	Periodontal treatment of the mandibular teeth and extraction of all maxillary teeth	Periodontal treatment and extraction of maxillary anterior teeth	Periodontal treatment
Phase 2	Conventional Complete maxillary denture	Conventional partial denture to replace missing #4, 7-10, 12, and 13	Orthodontic treatment to correct malpositioned teeth Maxillary interim valplast partial denture for missing #12 and 13 Ridge augmentation for implant site development to replace missing #12 and 13 with implant-supported prostheses
Phase 3	Replacement of missing #19 with an implant-supported crown Periodontal maintenance	Replacement of missing #19 with an implant-supported crown Periodontal maintenance	Replacement of missing #19 with an implant-supported crown Permanent lingual retainer for maxillary anterior teeth Resin bonded facial restorations on #7-10 Periodontal maintenance

PERIODONTAL CHART

Date 03/07/2016

Patient Last Name D

First Name

Date Of Birth

☐ Initial Exam☒ Reevaluation

Clinician AG

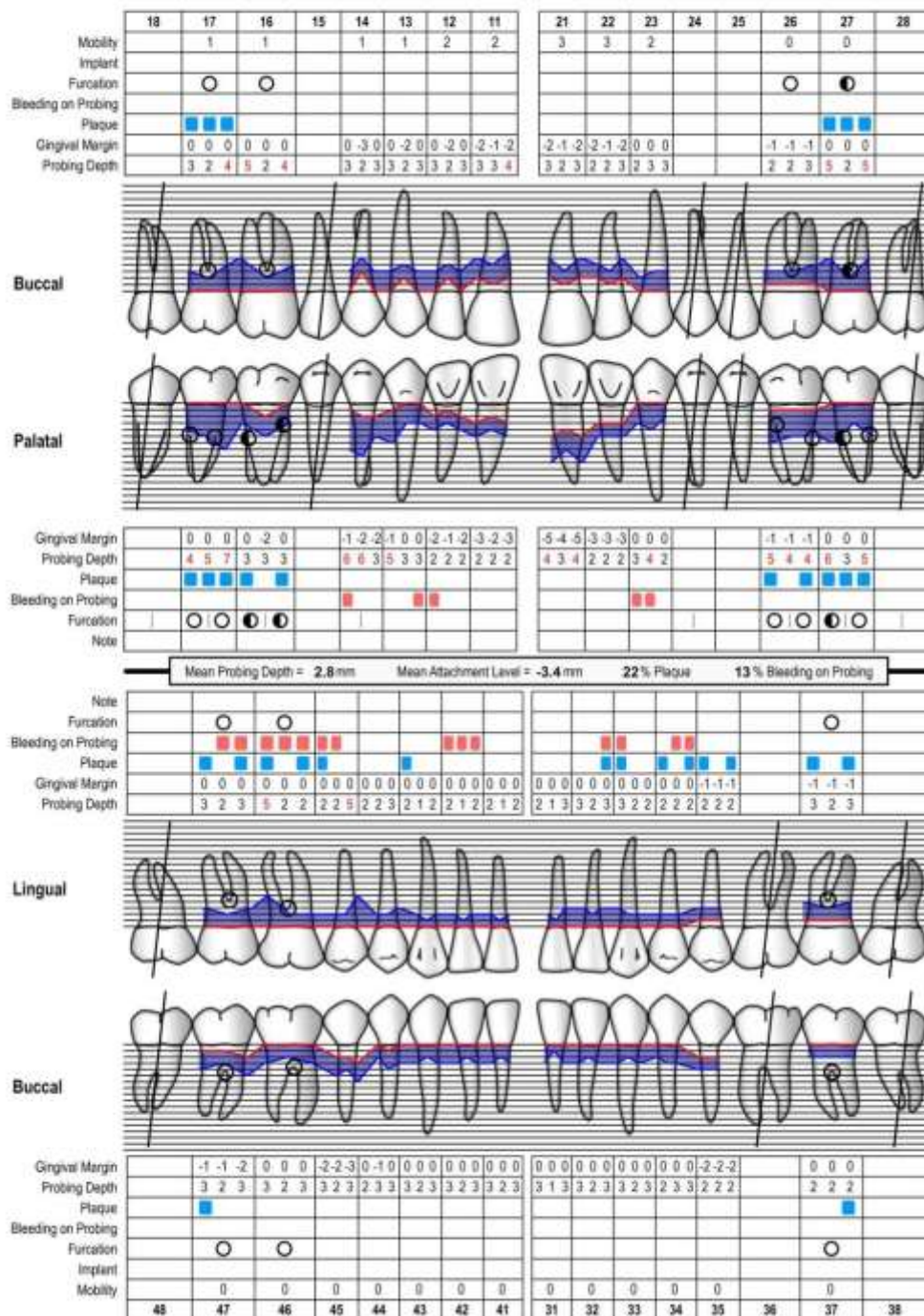


FIGURE 6 Periodontal charting at 1st re-evaluation (March 7, 2016).

with a customized oral hygiene regimen. The second step of therapy consisted of supragingival and subgingival instrumentation to control (reduce/eliminate) the supra- and subgingival biofilm and calculus.⁶ No

adjunctive systemic antimicrobials were used for this patient.

The therapeutic goals were to control the local and modifying factors, minimize inflammation, and stabilize



FIGURE 7 Intra-oral photograph during the orthodontic treatment. Note the significant tooth position improvement.

attachment and bone.⁷ The measurable therapy endpoints were: no periodontal pockets >4 mm with BOP or no deep periodontal pockets ≥ 6 mm.⁶

Re-evaluation at 4 weeks demonstrated adequate levels of self-performed oral hygiene, control of the local, predisposing factors, minimal BOP, optimal improvement in probing pocket depth, and gain in clinical attachment levels (Figure 6). However, for the one site with PD of 4 mm with BOP and the 13 sites with PD ≥ 5 mm without BOP that remained, repeated subgingival instrumentation was chosen as an intervention of the third step of therapy with a strict periodontal maintenance program for the rest of the dentition and re-evaluation every 2 months.⁶ After two consecutive visits of subgingival re-instrumentation and re-evaluation, the endpoints of therapy were achieved. The patient showed complete compliance with the oral hygiene regimens and was in a state of periodontal disease stability with no signs of progressive destruction.⁷ Clearance for orthodontic treatment was given and the patient was placed on SPC. The recall maintenance schedule was tailored to his needs every 2 months with re-treatment of the sites with detected recurrent disease as needed.

Fixed orthodontic appliances, using pre-adjusted brackets and straight wire technique were bonded 2 weeks later. Retraction and up-righting biomechanical forces were

applied with the aim of proper intercuspation, to correct the alignment of the migrated teeth, the overjet, the posterior crossbite, and the midline deviation. Proper force distribution, correct root positioning, and long-axis parallelism were also obtained.

The patient, happy with the improving esthetics during the orthodontic treatment, was further motivated and remained compliant with his home care and his 2-month maintenance visits (Figure 7).

CLINICAL OUTCOMES

With interdisciplinary collaboration, all treatment goals were achieved (Table 1), a stable occlusion was established, and periodontal health was maintained (Table 3). Post-treatment radiographs at one year demonstrated intact crestal bone and localized areas of bone fill (Figure 8).

After the completion of the orthodontic treatment, the maxillary anterior teeth were permanently splinted with a coaxial multistranded stainless steel wire retainer bonded to the lingual side. This retainer is easy to fabricate and allows teeth to retain their physiological mobility.⁸ The final prosthodontic treatment involved resin-bonded facial restorations for teeth #s 7 through 10 and a maxillary interim partial denture for missing #12 and 13 (Figures 9-11).

DISCUSSION

Although prognostic considerations are an integral part of treatment planning and patient communication, they have limitations and can be inaccurate for teeth that present with loss of periodontal support. Furthermore, the periodontium may be completely healthy even when mobility is permanently increased due to reduced periodontal support.⁷ As presented here, mobile teeth with initial questionable and hopeless prognosis were maintained in a healthy functioning and periodontal state for seven years.

TABLE 3 Timeline changes in periodontal parameters

	Baseline Pre-treatment	Reevaluation Preorthodontic treatment 3 months	Reevaluation End of orthodontic treatment 2 years	Re-evaluation 7 years
Number of sites with probing depth ≥ 5 mm	47	13	7	3
Number of teeth with Grade 3 mobility ⁵	3 (#8-10)	2 (#9 and 10)	1 (#10)	0
Number of teeth with Grade 2 mobility ⁵	2 (#7 and 11)	3 (#7, 8, and 11)	3 (#7-9)	0
Number of teeth with Grade 1 mobility ⁵	6 (#2, 3, 5, 6, 14, and 15)	4 (#2, 3, 5, and 6)	3 (#5, 6, and 11)	7
Full mouth bleeding score	80%	13%	9%	11%
Full mouth plaque score	100%	22%	26%	22%

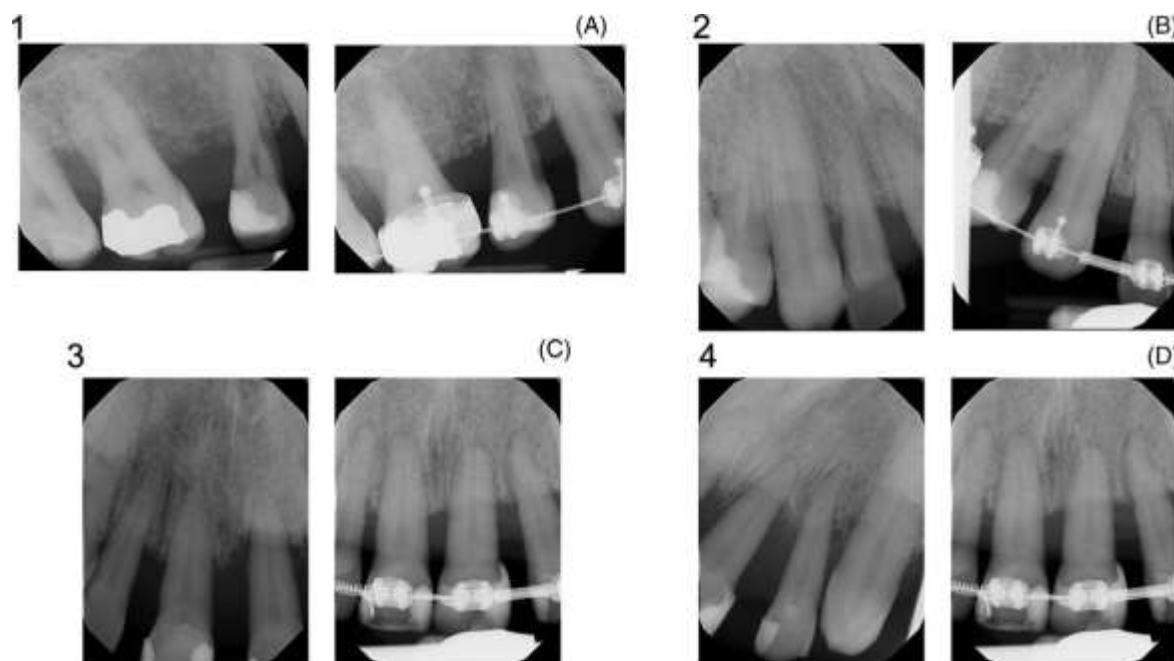


FIGURE 8 Pre-treatment (1-4) and during orthodontic treatment (A-D) comparative radiographs. Note the improved bone density and well-defined interproximal bone walls indicating no disease activity.



FIGURE 9 Post-treatment intra-oral photograph. Frontal view with resin-bonded facial restorations for #7-10.

An alternative treatment for the case presented to the patient was extractions and implant placement. Implants have a predictable result, however, we must consider that a history of periodontitis constitutes a risk factor/indicator for peri-implantitis, as demonstrated by numerous longitudinal and cross-sectional studies. With a reported prevalence of peri-implant mucositis and peri-implantitis as high as 19% to 65%, it is possible that even teeth compromised because of periodontal disease or endodontic problems may have longevity that surpasses that of the average implant.⁹

We, as periodontists, have been trained to preserve teeth¹⁰ and should not be so quick to extract periodontally compromised teeth, especially those teeth that can still serve a purpose in our treatment. Hopeless teeth can be used for strategic orthodontic anchorage and even show



FIGURE 10 Post-treatment intra-oral photograph. Maxillary occlusal view with a permanent lingual retainer on teeth #6-11 and maxillary interim partial denture for missing #12 and 13.

improvement after orthodontic treatment resulting in them being retained.¹¹

However, it is paramount that plaque control and the elimination of periodontal inflammation are achieved and sustained for the orthodontic treatment of periodontitis patients to be successful. Orthodontic forces in inflamed periodontal structures may contribute to a further and faster spread of the inflammation apically and to more associated bone loss.¹² Monitoring the periodontal status by the periodontist and the orthodontist and educating patients



FIGURE 11 Post-treatment extra-oral photograph.

in proper oral hygiene is necessary to prevent attachment loss during and after orthodontic treatment.

Another crucial component is the amount and type of applied orthodontic forces in patients who have clinical attachment loss. As periodontal support diminishes; the generated location of the orthodontic stress shifts apically¹³ therefore continuous light forces must be applied to move teeth and minimize occlusal trauma.¹⁴

Lastly, when orthodontic treatment is complete and the teeth are in their desired position, it is vital to provide permanent retention to avoid relapse.⁸

This case validates previous reports that orthodontic forces and tooth movements kept within biologic limits, in a healthy but reduced periodontium, not only prevent further periodontal breakdown but can improve conditions with the possibility of a new connective tissue attachment formation and improvement of bone support.¹¹

CONCLUSION

Interdisciplinary treatment along with proper periodontal supervision is still a viable option for patients with advanced loss of periodontal support and PTM to maintain their natural dentition.

AUTHOR CONTRIBUTIONS

Dr. Aikaterini Georgantza: conceived the idea for this case, performed the treatment, and led the writing; Dr. Maryse Manasse: performed the restorative work and critically revised the manuscript; Dr. Rogerio Tupinambá: contributed to the writing of the orthodontic treatment and critically revised the manuscript; Dr. Celestino Nobrega: contributed to the writing of the orthodontic treatment and critically revised the manuscript; Steven Pigliacelli: lab-

oratory diagnostic consultation. Dr. Yung Cheng Paul Yu: contributed to the editing of the photos and critically revised the manuscript. Dr. Jason Starace contributed to the editing of the manuscript. Dr. Leena Palomo: conceived the idea for the interdisciplinary coordination and editing of the manuscript.

All authors gave their final approval of this version of the manuscript and agreed to be published.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

REFERENCES

1. American Academy of Periodontology. *Glossary of Periodontal Terms*. 4th ed. American Academy of Periodontology; 2001.
2. Brunsdold M. Pathologic tooth migration. *J Periodontol*. 2005;76:859-866.
3. Martinez-Canut P, Carrasquer A, Magan R, Lorca A. A study on factors associated with pathologic tooth migration. *J Clin Periodontol*. 1997;24:492-497.
4. McGuire M, Nunn M. Prognosis versus actual outcome. II. The effectiveness of clinical parameters in developing an accurate prognosis. *J Periodontol*. 1996;67:658-665.
5. Miller SC. *Textbook of Periodontia*. 3rd ed. The Blakiston Co; 1950.
6. Sanz M, Herrera D, Kebschull M, et al. Treatment of stage I-III periodontitis - The EFP S3 level clinical practice guideline. *J Clin Periodontol*. 2020;47:4-60.
7. Lang N, Bartold M. Periodontal health. *J Periodontol*. 2018;89(1):S9-S19.
8. Gantidis N, Christou P, Topouzelis N. The orthodontic-periodontic interrelationship in integrated treatment challenges: a systematic review. *J Oral Rehab*. 2010;37:377-390.
9. Schwarz F, Derks J, Monje A, Wang H-M. Peri-implantitis. *J Periodontol*. 2018;89(1):S267-S290.
10. Giannobile WW, Lang NP. Are dental implants a panacea or should we better strive to save teeth? *J Dent Res*. 2016;95(1):5-6.
11. Mathews DP, Kokich VG. Managing treatment for the orthodontic patient with periodontal problems. *Semin Orthod*. 1997;3(1):21-38.
12. De Boever JA, De Boever A. Occlusion and periodontal health. In: *Functional Occlusion in Restorative Dentistry and Prosthodontics*. Elsevier Ltd; 2016:89-199.
13. Kuroe T, Itoh H, Caputo A, Nakahara H. Potential for load-induced cervical stress concentration as a function of periodontal support. *J Esthet Dent*. 1999;11:215-222.
14. Sabatoski CV, Bueno RC, Reyes Pacheco AA, Pithon MM, Tanaka OM. Combined periodontal, orthodontic, and prosthetic treatment in an adult patient. *Case Rep Dent*. 2015;2015:716462.

How to cite this article: Georgantza A, Manasse M, Tupinambá R, et al. Saving teeth: Revisited. Esthetic improvement and long-term periodontal stability of a pathologic tooth migration case: An 84-month follow-up. *Clin Adv Periodontics*. 2023;1-8. <https://doi.org/10.1002/cap.10244>