

Combined periodontal regenerative and prosthetic treatment of pathologic migration of anterior teeth

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ABSTRACT

Purpose: Pathologic tooth migration (PTM) commonly occurs in the anterior region and is associated with periodontal disease. The treatment of PTM of anterior teeth can be complex and time consuming, and a multidisciplinary approach is often required.

Materials and Methods: The patient was a 38-year-old woman with a chief complaint of saving and realigning her elongated maxillary left central incisor. This paper describes the successful combined periodontal regenerative (guided tissue regeneration) and prosthetic treatment and a 2-year follow-up of maxillary central incisor with pathologic tooth migration, deep intrabony defect, and poor prognosis.

Results: The right maxillary central incisor was restored by laminate veneer and the left by all-ceramic crown. The patient had no pain and discomfort and was satisfied with the outcomes of her treatment for 2 years. She has maintained her recall program at the Department of Periodontology at 3 months interval.

Conclusion: The key step in the successful treatment of PTM in anterior region is to obtain a high level of cooperation from the patient. Maintenance of the treatment result of PTM is dependent on the continuous preservation of periodontal health. (*J Korean Acad Periodontol 2008;38:405-412*)

KEY WORDS: guided tissue regeneration (GTR); pathologic tooth migration; anterior teeth; advanced periodontitis.

Introduction

Pathologic tooth migration (PTM) has been defined as a tooth displacement that results when the balance among the factors that maintain physiologic tooth position is disrupted by periodontal disease. It most commonly occurs in the anterior region and is a common finding associated with periodontal disease¹. PTM of anterior teeth produces not only functional problems, but also esthetic problems^{2,3}. Defects in esthetics may cause a significant social and psychological problem.

Although early stages of PTM may have corrected spontaneously following periodontal cause-related

therapy⁴⁻⁷, the treatment of PTM of anterior teeth can be complex and time consuming, and a multidisciplinary approach is often required, including periodontal, orthodontic and prosthetic or restorative treatment⁸⁻¹⁰. Appropriate case selection and careful treatment planning are critical to a successful outcome and patient satisfaction in multidisciplinary cases. Prior to finalizing the esthetic design, a treatment plan should be developed with comprehensive examinations and smile analysis, as well as a good understanding of the patient's expectations¹¹.

In the 1980s, guided tissue regeneration (GTR) was introduced into the clinical setting by Gottlow et al¹². The clinical outcomes of GTR in deep intrabony defects have been tested in many clinical trials¹³⁻¹⁶. This procedure was also applicable on the prosthetic abutment¹⁷. Nevertheless, several complications are also reported such as membrane exposure and gingival bacterial contamination etc^{18,19}. And the success of GTR depends on the clinician's experience and surgical

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skills²⁰⁾. Therefore, it is very difficult for periodontist to adopt the GTR procedure in such an esthetically sensitive area.

On the other hand, many young adults seem to deny treatment planning that involves having their teeth extracted. In the present study, a middle-age woman wanted to save her tooth as long as possible although it had a poor prognosis. This paper describes the combined periodontal regenerative (GTR) and prosthetic treatment of PTM of maxillary central incisor with deep intrabony defect and poor prognosis.

Case Report

1. Patient description

The patient was a 38-year-old woman with a chief complaint of saving and realigning her elongated maxillary left central incisor due to localized advanced periodontitis. She had no systemic problems. Extraction and rehabilitation of her maxillary left

central incisor was recommended by her general practitioner. But, she did not expect to extract that tooth.

2. Periodontal evaluation

At the initial examination, although the patient had good oral hygiene, she showed generalized mild gingival inflammation and intermittent dull pain. Periodontal probing showed deep pockets and subgingival heavy calculus deposits in entire posterior teeth. The pockets, especially, were deep around the maxillary molars and left maxillary central incisor (Fig. 1 and Table 1). Although the left maxillary central incisor had PTM, the tooth had adequate keratinized gingival tissue, thick biotype and class 2 mobility (Fig. 2a and 2b). Radiographically, severe bone loss was detected mesial and palatal aspects of the left central incisor (Fig. 3a). A diagnosis of localized advanced periodontitis was made.

Table 1. Clinical Measurements (mm) of Left Central Incisor at Baseline (Pretreatment) and after Guided Tissue Regeneration

Surface	PD		CAL		REC	
	pretreatment	after-GTR	pretreatment	after-GTR	pretreatment	after-GTR
mesiobuccal	5	2	6	6	1	4
Midbuccal	3	2	4	5	1	3
Distobuccal	3	2	4	5	1	3
Distolingual	5	2	6	4	1	2
Midlingual	7	3	7	5	0	2
Mesiolingual	10	4	10	5	0	1

PD: probing depth, CAL: clinical attachment level, REC: gingival recession.



Figure 1. Panoramic view at baseline showing bone loss in molar region and the left maxillary incisor.



Figure 2. Clinical aspect at baseline. (a) labial view, (b) occlusal view. Note the 1.0-mm diastema between the maxillary central incisors and 1.5-mm down shift of the left incisor. The gingiva surrounding the affected tooth shows thick biotype and coronally displaced gingival line.



Figure 3. Intraoral periapical radiograph of the maxillary anterior region. (a) At the baseline. The left central incisor had severe bone loss at the mesial aspect, (b) 2 years after guided tissue regeneration surgery. Note the bone fill in intrabony defect and narrowing of PDL space.

3. Periodontal treatment

The treatment goals for this patient were to eliminate periodontal inflammation and to correct esthetic problem involving her maxillary central incisor. At the patient's request, the authors decided to solve her esthetic problem not with an implant, but with regenerative periodontal and prosthetic therapy.

After basic periodontal treatment (subgingival scaling and root planning) was completed and intensive oral hygiene instruction was given. Occlusal interference was checked and occlusal adjustment was per-

formed to prevent traumatic occlusion. One month later, although the clinical signs of gingival inflammation and the pain had disappeared, deep pocket was left at mesial and palatal aspects of the left maxillary central incisor. According to the treatment plan, regenerative periodontal therapy (GTR) was performed.

Following local anesthesia, bucco-lingual intra-sulcular incision was performed from canine to canine. In the interdental area, sulcular incision was traced to preserve interdental gingival tissue. Releasing vertical incision was not performed. A full-thickness lin-



Figure 4. During guided tissue regeneration, wide and deep intrabony defect was detected at mesial and palatal aspects.

gual/palatal flap was gently elevated, and the remaining tissue of the defect-associated overlying flap was carefully dissected from the root surface. The defect was fully debrided and the surfaces were carefully scaled and planed with a manual instrument. Deep and wide intrabony defect was detected at mesial and palatal surfaces (Fig. 4).

The defect was treated according to GTR principles placing nonresorbable Gore-Tex membrane (Gore-Tex Periodontal Material, W.W. Gore & Associates, Flagstaff AZ, USA). Bovine bone powder (BBP[®], Oscotec Inc., Seoul, Korea) was placed into the defect to prevent collapse of the barrier and the overlying soft tissue. A membrane was positioned just coronal to the interdental alveolar crest to extend at least 3mm beyond the margin of defect. The membrane was firmly secured to both neighboring teeth with the enclosed e-PTFE sutures. Additionally, to prevent exposure of membrane, rotated split palatal flap was performed²¹⁾. The flap was then replaced and sutured employing non-absorbable e-PTFE sutures as previously described²²⁾.

The patient was prescribed 500mg of amoxicillin and acetaminophen 3 times a day in the first post-operative week. No mechanical oral hygiene procedures were allowed in the treated area. The patient was instructed to rinse 3 times daily with 0.12% chlorhexidine. No complications were found. The membrane was surgically removed after 7 weeks. Mucosal flap was raised and membrane was dissected

free and removed. The flap were adjusted and coronally displaced to cover the wound area, and sutured. The sutures were removed after 1 week. Postsurgical managements were repeated for 4 weeks. After this period, patient was instructed to gradually resume mechanical oral hygiene, including interdental cleaning and to discontinue chlorhexidine. The patient was maintained in maintenance programs at monthly interval for 6 months. At this appointment, she received full-mouth professional prophylaxis and calculus removal. No probing or deep subgingival instrumentation was attempted in the treated sites.

4. Prosthetic procedure

Three months following membrane removal, the treated tooth had class 1 mobility and no pain. The patient was referred to a prosthodontist, who pointed out the asymmetry of maxillary anterior gingival line and mesiodistal dimensions of central incisors (Fig. 5). He recommended clinical crown lengthening procedure and prosthetic rehabilitation of 2 teeth. But, the patient was satisfied that her tooth had no mobility and pain, and opted not to endure additional surgical procedures. After sufficient discussion with the patient, the prosthodontist decided to restore the maxillary central incisors. The left incisor was prepared for all ceramic restoration and restored with temporary acrylic resin crown (Fig. 6). After another 3 months of observation period, the prognosis of the tooth proved



Figure 5. Clinical aspect after completion of guided tissue regeneration. Note the gingival recession of the treated tooth.



Figure 6. Clinical aspect at delivery of temporary prosthesis.



(a)



(b)

Figure 7. Clinical aspect at 2-year after delivery of final prosthesis. Labial view and occlusal view. Note the closure of the black triangle between the central incisors.

favorable. So, the final prosthesis procedures were performed according to routine procedures. The right maxillary central incisor was restored by laminate veneer and the left by all-ceramic crown (Fig. 7a and 7b). The patient had no pain and discomfort and was satisfied with the outcomes of her treatment for 2 years. She has maintained her recall program at the Department of Periodontology at 3 months intervals.

Discussion

There is evidence-based information that the destruction of periodontal tissues plays a significant role in the etiology of PTM^{2,23)}. In this case, the affected

tooth had severe alveolar bone loss and tooth mobility. Selecting a method to manage PTM is usually based on an interdisciplinary approach. Many patient factors enter into the decision for the best treatment of PTM. These include patient compliance and cooperation, motivation to keep the natural teeth, economic factors, availability for treatment, and acceptance of surgical periodontal treatment, if necessary. From clinical observations, it appears that many cases of moderate to severe PTM are treated by extraction because of costly and time-consuming therapy. Additionally, there are many cases of severe PTM that can be treated in no other way but extraction because of the alveolar bone loss. But, in this case, the patient hoped to preserve her natural tooth

and receive no dental implant surgery.

Dental implant therapy has been widely introduced recently and become a routine treatment protocol in dentistry. But despite the high success rate of implant therapy, severe esthetic problems have been frequently encountered^{24,25}. Teeth with advanced periodontitis were especially troublesome in implant therapy. In the present study, the patient was very worried about the status after removal of her tooth and some surgical complications. So, she made the decision to keep her left central incisor with poor prognosis and make up the esthetics. The affected tooth also involved extrusion. The periodontal support of that tooth was so unfavorable that intrusion was not indicated. The treatment plan was regenerative periodontal surgery and prosthetic rehabilitation of 2 central incisors.

One of the major problems in GTR treatment of intrabony defects is the surgical management of the tissues in the defect-associated interdental space. In fact, lack of primary closure of the interdental space, flap dehiscence, or membrane exposure reportedly occurs in 70–80% of cases²⁶. The membrane exposure sites tended to achieve a smaller clinical attachment gain and had significantly greater marginal recession²⁷. New surgical incision techniques have been designed to preserve the interdental tissue and decrease membrane contamination^{22,28,29}. But, these new approaches have also had some membrane exposures and technical difficulties. Because this affected tooth had adequate keratinized gingival tissue and coronally displaced gingival line, the authors did not perform any other special incision techniques. However, rotated split palatal flap²¹ was performed to reinforce the interdental soft tissue thickness.

Implantation of xenogenic graft in combination with GTR for the treatment of intrabony defects does not have an added effect on the treatment outcome, compared with GTR alone³⁰ and bone formation is obstructed by implantation of these biomaterials³¹. But, we could not have used the bovine bone powder (BBP[®])

into the defect to prevent collapse of the barrier and the overlying soft tissue, since the space maintenance is the key factor of success in GTR procedure. In this case, owing to thick gingival tissue, the surgical complications (such as membrane exposure and gingival recession) were absent. Although radiographic appearance was unfavorable after 2 years (Fig. 3b), clinical periodontal examination shows minimal probing depth and tooth mobility (Fig. 7a and 7b). The patient was satisfied with treatment results and had no pain and functional discomfort. Periodic and meticulous periodontal follow-up is a requisite.

In conclusion, the key step of successful treatment of PTM in anterior region is to obtain a high level of cooperation from the patient: regenerative therapy requires a substantial contribution from the patient, in terms of compliance with a series of behavioral recommendations, modified oral hygiene methods, and topical and systemic medications. Maintenance of the treatment result of PTM is dependent on the continuous preservation of periodontal health.

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