Int J Clin Exp Med 2017;10(6):9614-9621
www.ijcem.com /ISSN:1940-5901/IJCEM0052237

Case Report

Treatment of periodontally hopeless mandibular anterior tooth using free gingival graft with stabilization of loosen teeth

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Received March 6, 2017; Accepted April 7, 2017; Epub June 15, 2017; Published June 30, 2017

Abstract: Periodontally hopeless tooth, along with clinical performance such as severe alveolar bone resorption, tooth mobility, pathologic tooth migration, was often extracted for treatment. Sometimes aesthetic and function of patients may be compromised. This article reported two cases with a novel alternative approach (free flagging graft with stabilization of loosen teeth) that aimed at retaining those hopeless teeth to satisfy aesthetic and functional needs. As a conclusion, this approach may be speculated a practicable alternative to keep hopeless tooth as possible for increasing periodontal supporting tissue and decreasing the tooth mobility.

Keywords: Periodontitis, periodontally hopeless tooth, free gingival graft, stabilization of loosen teeth

Introduction

Periodontitis is a chronic inflammatory disease mediated by multiple factors. The major clinical manifestations are gingival inflammation, destruction of periodontal connective tissue, resorption of alveolar bone, deep periodontal pocket, tooth loosening, pathologic tooth migration, and even tooth loss [1]. Horizontal resorption of alveolar bone is the most common type of resorption in patients with periodontitis. The main performance is the destruction of interalveolar septum, buccal or lingual alveolar ridge, which leads to the reduction of alveolar ridge height and various degrees of gingival recession. Because of thin gingival phenotype, the root surface of mandibular anterior teeth may frequently be exposed pathologically with the little width of the residual attachment [2]. Also there will be the loss of adjacent alveolar bone or soft tissue in case of severe periodontal destruction. These teeth that seriously affect the appearance, mastication and pronunciation are usually associated with Grade II or III mobility and ≥2/3 alveolar bone resorption, while the periodontal ligament still exists in the apical region. The adverse performances worsen prognosis from good towards poor or hopeless, leading to an eventual loss of natural tooth. A tooth with alveolar bone loss exceeded 50% or Class III furcation involvement was defined as "hopeless" [3].

Traditionally, the approaches including tooth extraction and implant placement or prosthetic reconstruction may lead to collapse of buccolingual and crown-root soft tissue inevitably in edentulous area [4]. Due to economic capacity, career needs, aesthetic requirements, psychological factors, systemic diseases and other factors, many patients strongly demanded to retain periodontally hopeless teeth (PHT) as much as possible. Therefore, there is an increasing tendency to extend life span of PHT and consolidate the therapeutic effect by increasing the periodontal support or periodontal tissue regeneration in modern periodontology [4-6].

It is widely accepted that the attached gingiva could protect periodontal tissues. In a case of progressive gingival recession, establishing sufficient width of keratinized gingiva would stabilize the gingival margin. Although narrow attached gingiva itself does not cause gingival inflammation, but it is not conducive to bearing friction from chewing and muscle tension from alveolar mucosa. Gingival margin is prone

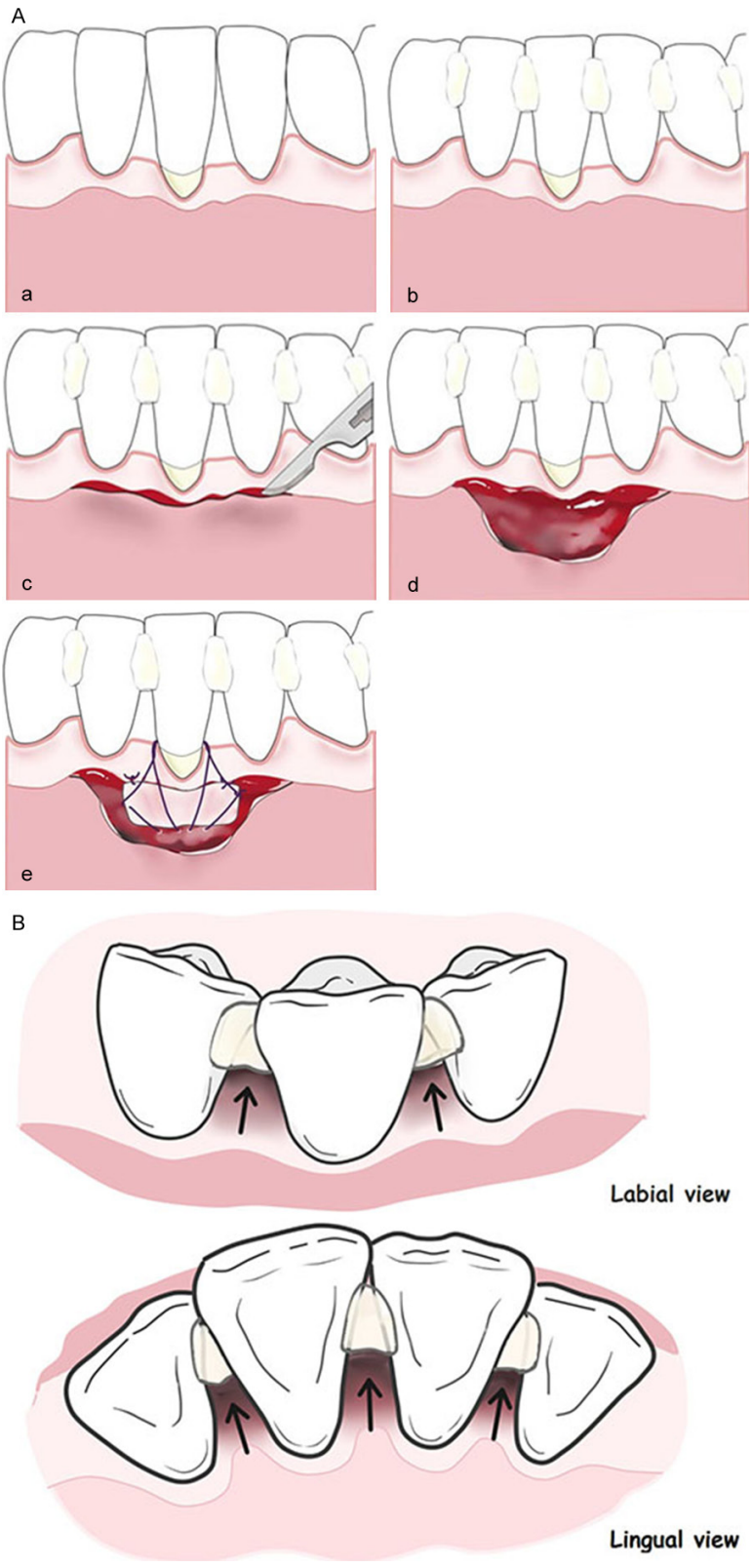

Figure 1. A. Abridged general view (a) From the preoperative view, there is obvious gingival recession and less of attached gingival width in mandibular anterior teeth area. (b) Super bond-lined composite restorations is performed both lingually and labially in proximal surface of mandibular anterior teeth. (c) The horizontal incision in the mucogingival line was made with a #15c knife. (d) A partial thickness flap was prepared leaving the periosteum at the recipient site. (e) The harvested graft was tightly sutured with 5-0 polyglactin suture material. B. Super bond-lined composite restorations are performed both lingually and labially in proximal surface of mandibular anterior teeth.

to separate from tooth surface. Then biofilm and food debris tend to accumulate in the gingival sulcus. Ultimately, it results in exacerbation of periodontitis and gingival recession. What is noteworthy is that the attached gingiva plays an important role in "Pink/White aesthetics". Bjorn and Sullivan & Atkins were the first to describe the free gingival graft (FGG). FGG can used to increase the amount of attached gingiva, the vestibular depth, the volume of gingival tissues in edentulous spaces and also for root coverage in areas of gingival recession [7]. Despite the aesthetic mismatches, technical requirements of free gingival grafts are not too high for clinicians and the prognosis is satisfactory. Furthermore, the increase of attached gingiva enhances the resistance to local stimulation, which effectively relieve and reduce local inflammation.

Stabilization of loosen teeth is a classical periodontal treatment based on the anatomical physiology and biomechanical principle. The aim is to establish balanced occlusion so as to stabilize loosen teeth for a long time [8]. Some studies have indicated that splinting of teeth could

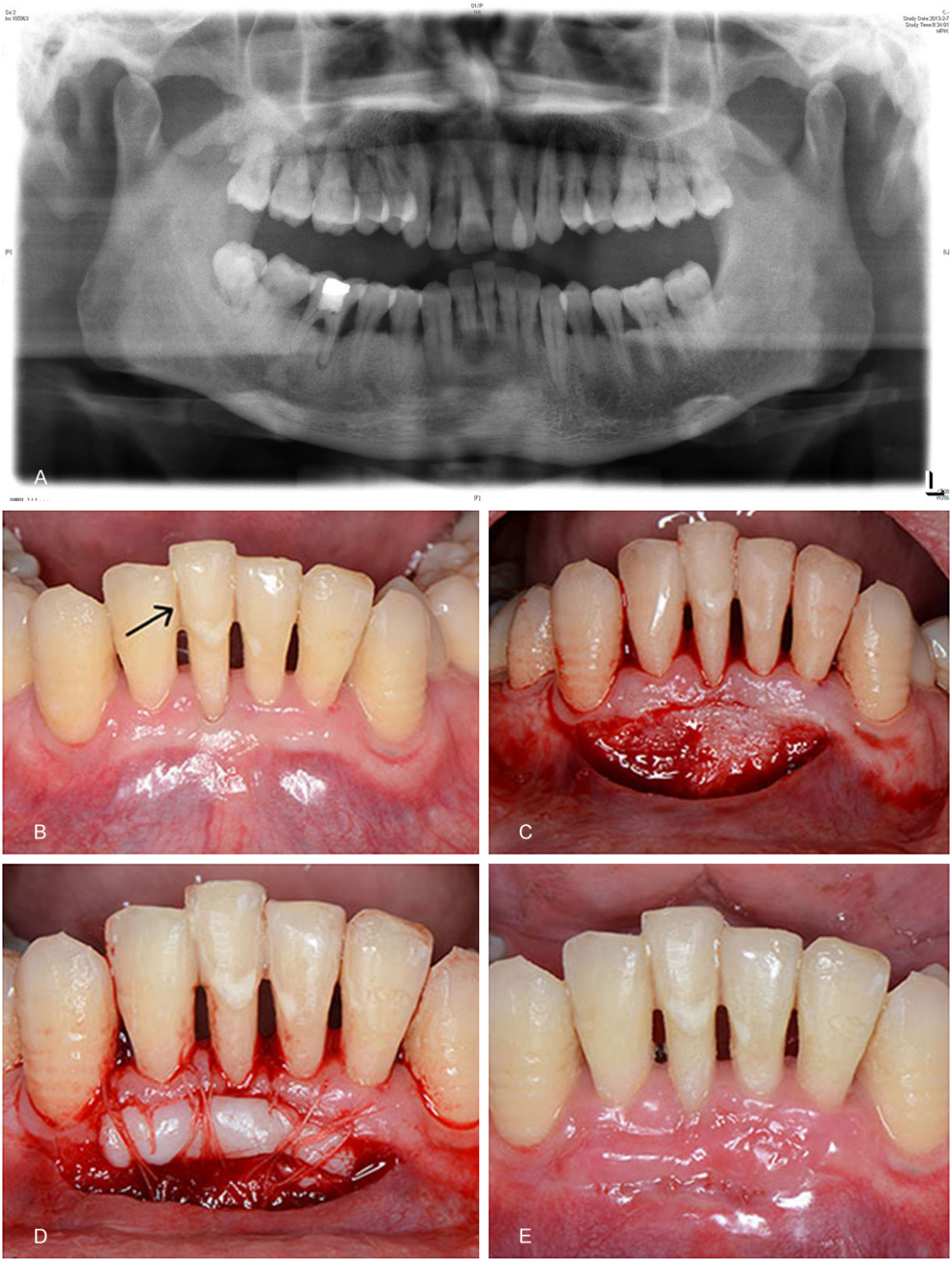

Figure 2. Pre- and intra-operative view of case 1. A. Panoramic radiograph view. In mandibular anterior teeth area, alveolar bone resorption reached the apical 1/3 and lamina dura was indistinct. B. Preoperative view with Miller's class III gingival recession and lack of keratinized gingiva in #25. Note the splint has been taken (Black arrow). C. Recipient bed was prepared for graft. D. Free gingival graft was harvested. Sutured harvested graft with 5-0 polyglactin suture materials. E. At 2 weeks post-surgery, the surgical recipient area was covered by new keratinized tissue.

improve the gingival microcirculation of teeth with severe periodontitis effectively and provide good conditions for periodontal tissue regeneration. However, simple splinting can only improve the tooth mobility. The problems such as attachment loss, aesthetic defects and the width of keratinized gingiva cannot be solved.

Therefore, this article was to present preliminary results of the modified treatment including stabilization of loose teeth and FGG, aiming to highlight the contribution of a novel approach in terms of increasing periodontal supporting tissue and keratinized gingiva.

Case 1

A 38-year-old Chinese male was referred to the Department of Periodontology. His chief complaints were severe mobility and gingival recession in mandibular anterior teeth region. The treated teeth, clinically, had III mobility, inflammation, gingival recession and absence of attached gingiva. Radiographically, alveolar bone resorption in mandibular anterior teeth area reached the apical 1/3 and lamina dura was indistinct (**Figure 2A**). He denied biting hard objects or history of trauma. And as a non-smoker, he had no history of any systemic diseases and no allergies to any medicines.

Abridged general view of therapeutic steps was shown in **Figure 1**. After initial therapy including scaling and root planning, tooth stabilization was performed from tooth #22 to #27 with Super bond-lined composite restorations (Super-Bond C&B, Sun Medical Co., Ltd, Japan) (**Figure 1B**). Embrasures were checked carefully and trauma from occlusion was eliminated. At 6 weeks following initial therapy, a periodontal re-evaluation was performed to confirm the suitability of the surgical procedure (**Figure 2B**). Informed consent was provided from patient.

On the day of surgery, 0.12% chlorhexidine rinse was used for intraoral antisepsis and the local anesthesia was performed with 2% articaine with epinephrine 1:100,000. The horizontal incision along the mucogingival line was made with a #15c knife. A clean, damp gauze pad was used for blunt dissection. Then, a partial thickness flap was prepared leaving the periosteum at the recipient site (**Figure 2C**). After measuring at the recipient site with a periodontal probe, the measurements of the palate were recorded and a graft was harvested from the palate. The harvested graft was then immediately sutured with 5-0 polyglactin suture material (Coated VICRYL® Plus Antibacterial, ©Ethicon, US) on the recipient site for immobilization and decreasing the amount of dead space (**Figure 2D**). Ultimately, a periodontal dressing (Vocopac®, Voco, Cuxhaven, Germany) was applied over the graft to protect the recipient site.

The patient was prescribed amoxicillin 500 mg and metronidazole 200 mg, 3 times per day for 1 week to control inflammation. Also he was advised not to brush the treated region for 4 weeks and just rinse mouth twice daily with 0.12 % chlorhexidine. The periodontal dressing and the sutures were removed at 2 weeks after surgery. The palate donor area and the recipient site had healed with expectations (**Figure 2E**).

Patient was recalled for periodontal examination at 3 months' intervals. The case was followed up for a period of 16 months (**Figure 3A-C**).

The result showed that there was a significant reduction in recession depth, probing pocket depth and an increase in keratinized gingiva width (**Figure 4A-D**). Gingiva was healthy and no bleeding on probing. Radiographic evaluation points out that the new bone and lamina dura was detectable in apical area (**Figure 4E**). The patient was very satisfied with the results of treatment because teeth mobility was decreased and quality of life has improved dramatically, although the color and shape of the surgical area were not well matched.

Case 2

A 37-year-old Chinese male reported with a chief complaint of sensitivity and gingival recession in lower anterior left teeth region. On clinical examination, he had a Miller's Class III gingival recession in #24 with a wedge-shaped defect, grade II mobility and inflammation (**Figure 5B**). The panoramic radiograph presented a ≥2/3 alveolar bone resorption in #24 (**Figure 5A**). The amount of attached gingiva was little. He was healthy, a non-smoker, and free from allergies.

Six weeks after scaling and root planning, a periodontal re-evaluation and tooth stabilization was performed with Super bond-lined composite restorations. The FGG surgery procedure

Figure 3. Postoperative outcomes of case 1. A. Appearance of recipient site at 2 m post-surgery. B. Appearance of recipient site at 9 m post-surgery. C. Appearance of recipient site at 16 months post-surgery.

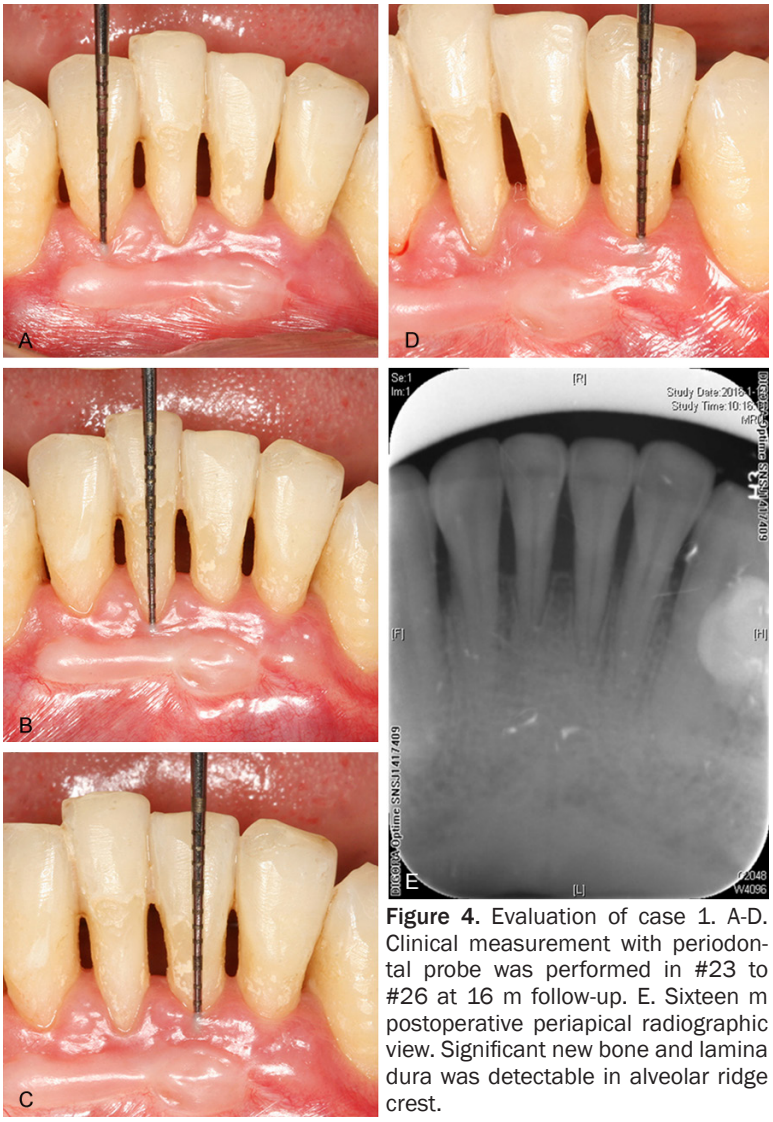

Figure 4. Evaluation of case 1. A-D. Clinical measurement with periodontal probe was performed in #23 to #26 at 16 m follow-up. E. Sixteen m postoperative periapical radiographic view. Significant new bone and lamina dura was detectable in alveolar ridge crest.

was similar to that in Case 1 (**Figures 1A**, **5C**, **5D**).

The patient was prescribed and advised as in Case 1. The periodontal dressing and the sutures were removed at 2 weeks after surgery (**Figure 6A**, **6B**).

Two months later the patient was recalled for periodontal examination (**Figure 6C**). New keratinized gingiva was detected in surgical area and recession depth was reduced. Gingiva was healthy and no bleeding on probing. The patient did not complain about any discomfort. And the tooth mobility and masticatory function had improved. Simultaneously, radiographic evaluation shows a little new bone had generated in alveolar ridge crest (**Figure 6D**). The patient was recalled at 1 year after surgery with no complaints. The width of attached gingiva and Super bond-lined composite restorations were stabilized. The mobility of teeth was decreased satisfactorily and the patient did not realize any color-matching problems for diminished scars (**Figure 6E**). Periapical radiographic showed lamina dura was fairly obvious in alveolar ridge crest and implied apparent new bone formation.

Discussion

It is difficult to treat severe periodontitis for terrible damage of periodontal tissue and loss of alveolar bone. On account of beauty, pronunci-

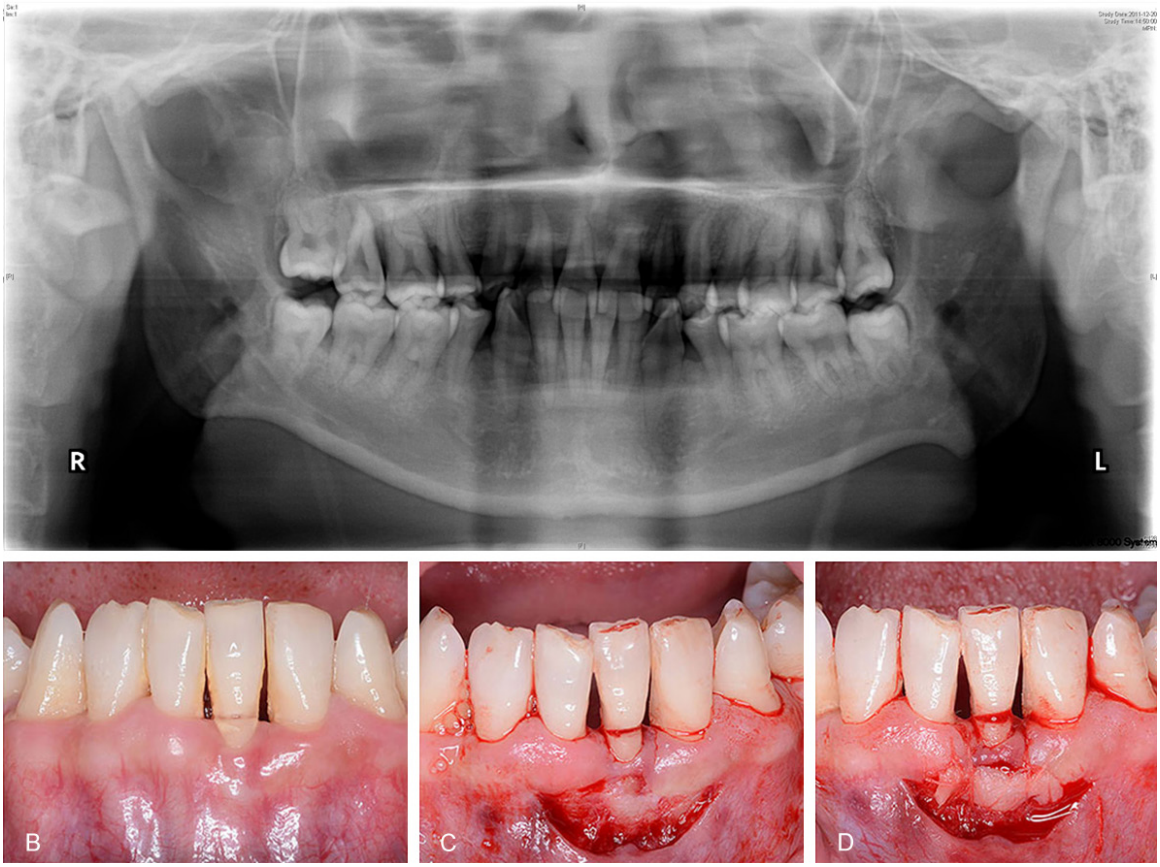

Figure 5. Pre- and intra-operative view of case 2. A. Panoramic radiograph view. In #24, alveolar bone resorption reached the apical 1/3 and lamina dura was indistinct. B. Preoperative view with Miller's class III gingival recession and lack of keratinized gingiva in #24. C. Incisions were given and recipient site was prepared. D. Photograph of the graft after suturing with 5-0 polyglactin sutures.

ation, masticatory function, general health status and other factors, some patients cannot give consent to tooth extraction treatment. While patients who received this novel approach finally retained their periodontally hopeless teeth and improved the quality of life greatly.

Whether severely compromised teeth retain or not is based on precise prognosis judgment by clinicians. In the past, the majority of the prognosis lay on tooth mortality [9, 10]. Researchers then found that factors that influence prognosis can be continuously changed. After the in-depth research, prognosis cannot be based on a single observation. A growing number of evidence supports that the prognosis has great potentialities to change from hopeless to fair or favorable prognosis in the patient's mouth provided good oral hygiene and regular prophylaxis are performed [11-14]. Cortellini *et al.* had compared the efficacy of periodontal treatment with extraction and prosthetic treatment for PHT [14]. It is recommended that periodontal regeneration should be carried out before extraction of PHT. This generates a need for the clinician to develop newer techniques to satisfy those requirements without extraction. Huseyin *et al.* documented 15-month results of FGG combined with stabilization of loosen teeth applied following intentional replantation (IntR) and the treated teeth survived with healthy gingiva, reduced pocket depth and new hard tissue formation. However, intentional replantation (IntR) is complicated to operate for clinicians. It's necessary to complete the root canal treatment before surgery, and must first extract the teeth and then replant. It is not applied to patients who are not suitable for or disinclined to do tooth extraction.

Hence, the authors combined stabilization of loosen teeth with FGG to treat those PHT with Miller III or IV and Grade II or III mobility. Loosen teeth are fixed with health teeth to establish a new masticatory unit by stabilization of loosen teeth. Periodontal membrane fibers of mul-

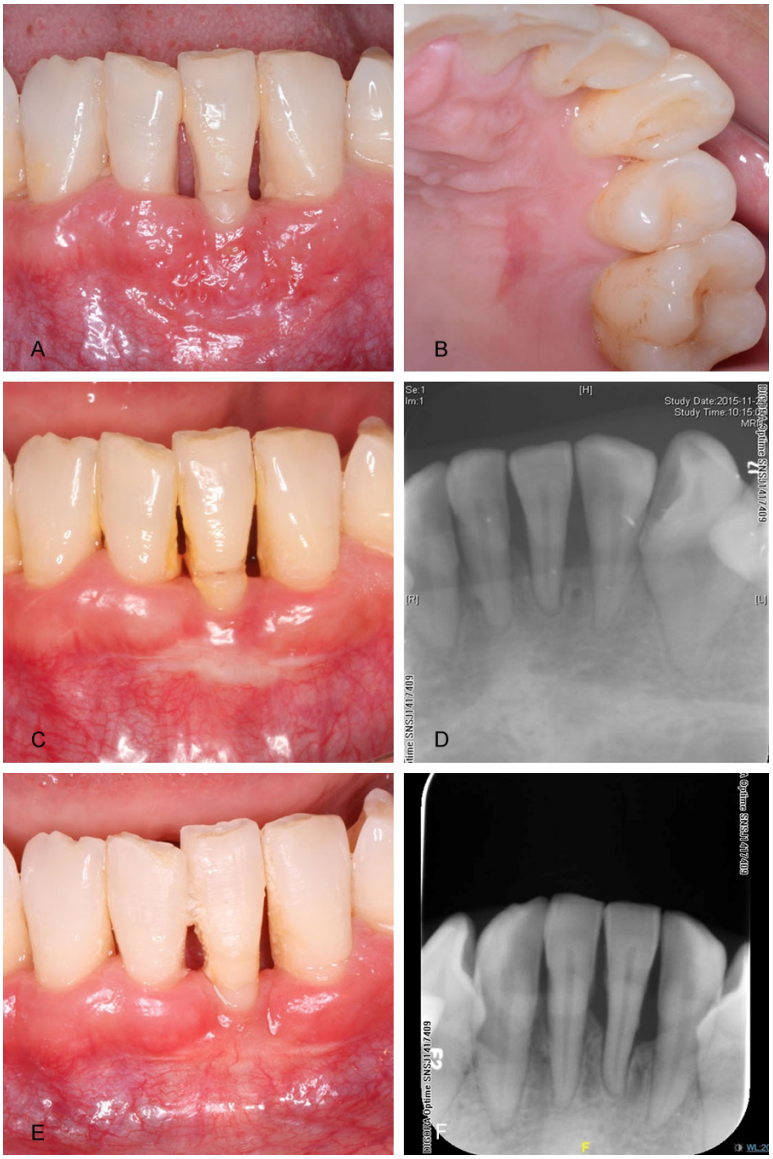

Figure 6. Postoperative outcome and evaluation of case 2. A. Appearance of recipient area at 2 w post-surgery. The surgical recipient area was successfully covered by new keratinized gingiva. B. Two weeks postoperative view in donor site and the wound healed well. C. Appearance of recipient site at 2 m post-surgery. D. Periapical radiographic view at 2 m post-surgery. A little new bone formation was found in alveolar ridge crest. E. Appearance of recipient site at 1 y post-surgery. The scar was decreased and the Superbond was still well retained. F. Periapical radiographic view at 1 y post-surgery. New bone formation was found apparently in alveolar ridge crest and lamina dura was fairly obvious.

tiple teeth bear the occlusal force from different directions together when those teeth received [15]. Thus, it could promote the healing of the damaged periodontal tissues by dispersing occlusal force and restoring masticatory function. After taking a stress analysis in anterior teeth, some scholars had come to a conclusion that the stress values of mandibular central and lateral incisors decrease while canine increases through stabilization of loosen teeth. It proves that the periodontal splint can disperse stress to adjacent teeth effectively so that the surplus support potential of canine would reduce the damage of periodontal tissue.

Superbond C&B is a type of chemosetting, 4-META MMA-TBB cement mixed with liquid and powder. The bond strength could be up to 120~150 kg/cm^2. There is a high affinity between component of Superbond C&B and dental tissue for it can produce favorable mechanical interlocking with enamel and dentin [16]. Some researchers reported that as periodontal splint, Superbond C&B is comfortable and beautiful, has no need to do tooth preparation and has a high degree of satisfaction. The surface is smooth so that it does not hinder patients from plaque control. Under the premise of strict self-plaque control and regular periodontal maintenance, it could improve masticatory function and the quality of life certainly [17].

Despite several researches reported that the root coverage rate of FGG is 11~87% and the most significant disadvantage resides in unmatched gingival color, it is still the better surgical approach for increasing crown-root width of keratinized mucosa (attached gingiva), especially for the gingival recession of lower anterior teeth which associated with insufficient keratinized gingiva [18].

In these cases, the results have shown a great improvement in probing depth, tooth mobility and there were significant gains in the width of keratinized gingiva. Both of two patients expre-

ssed satisfaction of life quality for the better mastication and pronunciation. Meantime, the decrease of tooth mobility relieved psychological burden to some extent.

All cases gained satisfactory attached gingival width and root coverage accompanied by mobility decreased. Meanwhile X-ray points out that the new bone and lamina dura was reappeared in apical area. As a conclusion, the technique of FGG combined with stabilization of loose teeth maybe speculated as a convenient alternative to simple extraction for those anterior teeth suffered from gingival recession and serious mobility. It is possible to keep the periodontally hopeless teeth and promote periodontal tissue regeneration. Due to the number of cases in this report, more clinical randomized controlled trials are necessary for evidence.

Acknowledgements

Supported by Shanghai Summit & Plateau Disciplines (No. 20152523), National Natural Science Foundation of China (No. 81670992) and Chinese Stomatological Association (No. CSA-Y2015-01).

Disclosure of conflict of interest

None.

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