Case Reports in Dentistry
CASE REPORTS IN DENTISTRY

DIAH AYU MAHARANI
EDITOR

DENTISTRY AND ORAL SCIENCES

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Chapter 33

PERIODONTAL SURGICAL THERAPY
FOR ORTHODONTIC FIXED
APPLIANCE COMPLICATIONS

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ABSTRACT

Using an orthodontic fixed appliance without considering the force and pressure of any activation will cause overloading of the teeth. Excessive force and pressure can result in bone resorption in the buccal and lingual areas of the jaw as well as deepening of the pockets, recession, and mobility of the teeth. Performing periodontal surgery on the mandible by augmenting a mixture of bone substitute materials to enhance bone density and reduce pocket depth and teeth mobility. A 35-year-old woman came to RSKGM U I complaining of mobile anterior lower teeth due to orthodontic treatment. Intraoral showed that the appliance had been fixed at the mandible for three years. Upon clinical examination, gingival recessions were found around the teeth and deepening of the pockets was observed at the mandible. A non-activated fixed appliance was used as a splint in an open flap debridement simultaneously with guided tissue regeneration using a combination of a demineralized freeze-dried bone allograft (DFDBA) and a xenograft, and the appliance was covered with a resorbable dental membrane. The preliminary evaluation found a decrease in the pocket depth, a reduction in teeth mobility and no differences in gingival recession.

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Keywords: open flap debridement, guided tissue regeneration, splint, recession

1. INTRODUCTION

Orthodontic treatment, especially fixed orthodontic appliances, can affect periodontal integrity [1]. The use of fixed orthodontic appliances has been proven to increase plaque retention due to difficulties in self-cleansing and maintaining good oral hygiene. One report found that fixed orthodontic appliances could exacerbate unresolved inflammatory processes and accelerate periodontal tissue destruction and attachment loss, even in patients without periodontal disease [2]. Moreover, sharp bands and wires could cause mechanical trauma to the gingiva, and pressure from the appliance forces activation affects the integrity of the periodontal tissue [3].

In essence, orthodontic appliances create pressure and tension causing the teeth to shift. With a degree of force, periodontal ligaments are subjected to pressure resulting in stress that changes the blood flow in the periodontal ligament; this stimulates chemical mediators and, eventually, activates cells, such as osteoblasts and osteoclasts, which facilitate the movement of teeth [4]. The inadequate periodontal support that receives greater force could be damaged from orthodontic extrusion, intrusion, molar uprighting, labial tooth movement or proclination, especially in lower anterior teeth [2].

An assessment of the severity must be performed to determine the appropriate periodontal treatment when periodontal tissue is damaged by a fixed orthodontic appliance. Initial treatment, such as scaling and root planing, oral prophylaxis, splinting, occlusal adjustment and restoration, could be done to improve support for teeth with periodontal damage [5]. When deep pockets, gingival recessions, and tooth mobility are present, flap surgery is performed to facilitate periodontal tissue debridement, decrease pocket depth with pocket wall resection and allow for regenerative treatment [6]. After flap reflection for debridement, subsequent periodontal treatment concentrates on the formation of new adhesions. While new cells proliferate for regeneration, the epithelium of the inserted tissue could proliferate and be placed on the connective tissue and cementum. Therefore, a membrane is required to inhibit epithelial migration along the cementum wall and to stabilize the clot. This method is known as guided tissue regeneration (GTR) [7].

GTR is usually combined with graft material to maximize the treatment outcomes. Three types of graft are commonly used in periodontal treatment: an autograft, if the graft is obtained from the graft recipient; an allograft, if the graft is obtained from an individual that is genetically different from the recipient, but in the same species; and a xenograft, if the graft is obtained from a species that is different from the recipient. The selection of the type of graft is determined based on the osteogenic, osteoinductive and osteoconductive potentials of the graft materials and the dimensions of the defect area. A
combination of these three types of graft materials can also be used to ensure a better result [7].

This case report aims to evaluate whether or not aggregate therapy, such as a combination of flap treatments, GTR and natural periodontal treatment in a patient with an orthodontic fix appliance complication, might be sufficient to improve the condition of the periodontium tissue.

2. CASE REPORT

A 34-year old woman seeking treatment for severe periodontitis and tooth mobility came to a dental hospital. Her orthodontist had referred her to periodontal therapy. Her primary complaint was a movement of the mandibular anterior teeth. She had been using a fixed orthodontic appliance to improve her tooth alignment for three years. She was self-conscious about the mobility of her teeth, and she had no history of smoking. Upon clinical examination, intraoral loss of attachment, probing depth, plaque index, bleeding on probing and teeth mobility were determined. The severe gingival recession was observed in the lower incisors, and she had a slight deep bite (Figure 1).

The main problem occurred in the anterior region. Initially, treatment was started by using scaling and root planing. The patient was motivated to improve her condition, and she was instructed to maintain good oral hygiene. Two weeks later, evaluation of the periodontal condition revealed the persistence of localized lingual defect in the mandibular anterior, with a probing depth of 5 mm and a labial recession of about 1–2 mm, with a mobility degree 2. Based on that condition, a full thickness flap with a GTR procedure was planned.

Figure 1. Initial condition: a thin soft tissue at the labial of the lower anterior region.
The full thickness flap reflection showed no bone in the facial region of the lower anterior mandible (Figure 2). Debridement was conducted by eliminating the granulation tissue and treating the root surfaces and irrigating the area with saline. Then, a mixed bone graft of demineralized freeze-dried bone allograft (DFDBA) (Sure Oss®Hans GBR) and xenograft (Osteoxenon®, Bioteck), with a 1:1 composition, was placed around the defect. Two pieces of 1x2 mm resorbable pericardium membrane (HEART®, Bioteck) was applied to cover the graft in the labial area.

The flap was repositioned and sutured with 5.0 monofilament thread in an interdental area using an interrupted suturing technique. Application of the periodontal pack was meant to prevent undesirable movement of the graft area (Figure 3). The patient was instructed to rinse with chlorhexidine on a weekly basis to control for the bacterial plaque. At the one-to-two-week follow-up, healing was uneventful; the gingiva was oedematous and swollen. Surprisingly, at the three-week follow-up a healthy color of gingiva, increased attachment and no sign of inflammation was observed (Fig 4). Recession persisted due to the insufficient bone at the interdental papilla of the buccal bone area, despite the fact that GTR had been performed.

Figure 2. Flap and GTR procedure; (A) Open flap debridement simultaneously eliminating the granulation tissue; (B) The mixture of grafting materials was augmented; (C) Resorbable membrane; (D) The dental membrane was covered at the labial area.
3. DISCUSSION

Gingival recession in lower anterior teeth is a common finding after orthodontic treatment. Proclination or labial tooth movement is the most effective procedure to resolve anterior crowding. Labial tooth movement might result in decreasing the labiolingual width of the labial gingiva and apical migration of the gingival margin. Available bone and tissue have been found to play an important role as a defense against pressure when orthodontic forces are applied to a tooth [2]. In the case presented in the present paper, a recession occurred due to limited bone and tissue when orthodontic force was applied. Pressure from orthodontic treatment worsened the condition and resulted in a labial bone loss, gingival recession and teeth mobility.

Some previous studies have mentioned that GTR on a flat defect area would not result in complete recovery because the presence of less healthy bone makes it difficult to maintain the scaffold [8, 9]. In such a case, it is expected that combining allograft and xenograft methods with the application of a xenogenic membrane could result in bone regeneration in the labial area. However, although this technique uses different types of resorbing materials and the osteoinductive capacity of DFDBA, it might support the bone regeneration process while a xenogenic membrane could help prevent epithelial migration to the defect site [10–12].

The recession is inevitable in the healing process due to an advanced bone loss in the labial area. Successful GTR could maintain the level of clinical attachment and prevent tissue breakdown if a patient maintains good oral hygiene. Further treatment with an orthodontic appliance might be needed to decrease the recession level caused by movement intrusion. The timing of the orthodontic movement should be delayed until the
bone and tissue are fully recovered and regenerated, which is approximately 3–4 months afterward.

CONCLUSION

Inadequate orthodontic forces on compromised periodontal tissue might result in a gingival recession. Periodontal treatment options for the gingival recession and tooth mobility range from non-surgery to GTR. Open flap and GTR might be used to correct bone deformities after orthodontic treatment. Follow-up and cooperation between the periodontist and orthodontist are necessary to obtain healthy periodontal tissue and good orthodontic treatment outcomes. Furthermore, when researching this field, it is important to emphasize that a standard language must be established between periodontists and the orthodontists to eliminate the existing communication barrier; doing so will improve the treatment outcomes. Due to the limitation of the patient presented in this case study, this preliminary study only identified a slight outcome for the complication of the orthodontic fixed appliance. However, it is possible that a better result could be obtained in the future if more case studies are evaluated.

REFERENCES


