Volume 2, 2021, 833643

GUHES

Journal of Gazi University Health Sciences Institute

journal homepage: https://dergipark.org.tr/tr/pub/guhes

Periodontal Approach of A Patient With Periodontitis Before Orthodontic Treatment: Long Term Follow-Up

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Article info:

Received: 01.12.2020

Accepted: 09.02.2021

Keywords:

Gingival recession, Orthodontics, Pathological tooth migration, Periodontitis.

Abstract

The aim of this case report was to present the comprehensive periodontal treatment and two-years follow-up results of an adult patient with Stage III, Grade C periodontitis who had pathological tooth migration (PTM) with gingival recession before orthodontic treatment. Full mouth plaque and gingival indices, bleeding on probing, probing depth and clinical attachment loss of patient were measured. Vertical bone losses in the central, lateral incisors and molar regions were found. Clinical attachment loss was 5.17 mm. Gingival recessions of #31 and #34 teeth were 4 mm and 5 mm, respectively. #31 tooth had Class II mobility. A combination of amoxicillin and metronidazole (AMOX/MET) was recommended for seven days during full mouth scaling and root planing. Flap operations and free gingival grafts (FGGs) were performed. After the six-week recovery period, non-extraction fixed orthodontic treatment was started. At the end of two years follow-up, gaining of keratinized tissue was detected as 3 mm in both teeth and 3.09 mm of clinical attachment level gain was ensured while orthodontic treatment continued. This case report presents that periodontal treatment provides long-term periodontal stability during fixed orthodontic treatment.

1. Introduction

Periodontitis is a chronic inflammatory disease of the tooth-supporting tissues. The severity and progression of periodontal disease is regulated by the interactions among the personal behavior, host response which was affected by systemic risk factors, and infectious agents (Bergström & Preber 1994; Tonetti, Greenvell & Kornman, 2018). According to the Armitage classification, periodontitis is divided into forms as chronic or aggressive (localised and generalized) or necrotizing or a manifestation of systemic diseases (Armitage, 1999). Aggressive periodontitis is defined as a destructive periodontal disease with an early age of onset, periodontal tissue loss of multiple teeth, and increased disease progression rate, and the absence of systemic diseases (Albandar, 2014). There is a little consistent evidence that aggressive and chronic periodontitis are different diseases. Individually, there is an evidence of multiple factors, and interactions among them, that influence clinically observable disease outcomes (Tonetti et al., 2018). With this opinion, new periodontitis classification scheme has been adopted, in which forms of the disease previously recognized as “chronic” or “aggressive” are now grouped under a single category “periodontitis” and are further characterized based on a multidimensional staging and grading system (Papapanau et al., 2018). Therefore, aggressive periodontitis is expressed as stage and grade rather than under a single heading.

Flaring of the anterior teeth, spaces, rotations, overeruption, and pathological tooth migration (PTM) in the distolabial direction of the teeth are common complications in the aggressive periodontitis (Cardaropoli & Gaveglio, 2007). PTM occurs due to the several factors such as; disturbance of balance among the factors that maintain physiologic tooth position due to inflammatory pressure in bone defects during periodontal disease abnormal tooth positions, and occlusal factors (Newman, Takei, Klokkevold & Carranza, 2012; Brunsvold, 2005).

Irreversible bone loss will occur when patients with active periodontal disease are treated with orthodontic treatment. (Årtun & Urbye, 1998). On the other hand, plaque retention leads to development of gingivitis and then periodontal breakdown (Zwetchkenbaum & Taichman, 2008). Therefore, maintaining acceptable oral hygiene and professional plaque removal procedures are essential prior to starting orthodontic treatment (Sebbar, Abidine, Laslami & Bentahar, 2015).

Gingival recession is associated with the presence of bone dehiscence underneath, where the gingival margin is displaced apical to the cemento-enamel junction (Jati & Furquim, 2016). Lang and Löe (1972) reported that gingival health can be maintained with at least 2 mm keratinized gingiva and 1 mm attached gingiva to ensure periodontal stability (Lang & Loe, 1972). For this reason, free gingival graft (FGG) is generally recommended before orthodontic treatment in cases with minimal keratinized gingiva. (Pini Prato, Baccetti, Magnani, Agudio & Cortellini, 2000; Wennström, 1996).

The aim of this case report is to present the periodontal management of a patient with Stage III, Grade C periodontitis accompanied with gingival recessions and PTM in order to restore the loss of

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soft tissues prior to initiation of orthodontic treatment, and two years follow-up period.

2. Case Presentation

A 20-year-old woman who chiefly complained of gingival bleeding and maxillary midline diastema and spacing in mandibular incisors admitted to the Orthodontics department of the University. She had Angle Class II Division 1 subdivision malocclusion and rotations in maxillary lateral teeth and mandibular posterior teeth. She had a good facial esthetic and lips were competent based on extra-oral examination. Intra-oral examination revealed that spacing of 3 mm between mandibular right central and lateral teeth. The mandibular left first molar had been extracted before the age of 14 years. It was observed that the rotated mandibular left second premolar erupted spontaneously into the extraction space of the first molars.

She was non-smoker and had no systemic diseases. The periodontal assessments were as follows: plaque index (PI) (O'Leary, Drake, & Naylor, 1972) was 65%, gingival index (GI) (Löe & Silness,1963) was 0.45, bleeding on probing (BOP) (Ainamo & Bay, 1975) was 60%, probing depth (PD) was 5.04 mm, and clinical attachment loss was 5.17 mm. Gingival recessions of lower right central incisor (#31) and lower left first premolar (#34) were 4 mm and 5 mm; respectively, and #31 had Class II mobility (Glargia & Lindhe, 1997). (Table 1; Figures 1A, 1B and 1C).

Radiographs demonstrated vertical bone loss in the central, lateral incisor and molar regions in the maxilla and mandible; and in the other regions horizontal bone loss was found (Figures 2A, 2B and 2C). PTM was observed in the anterior region.

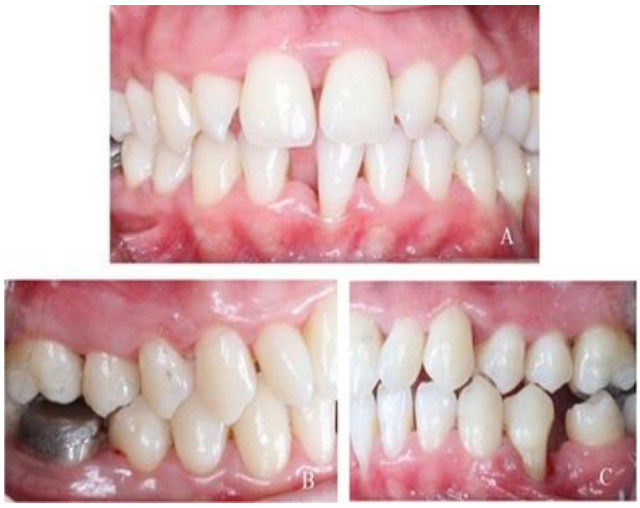

Figure 1: Intra-oral photographs before treatment; (A) frontal photograph, (B) right buccal photograph, (C) left buccal photograph

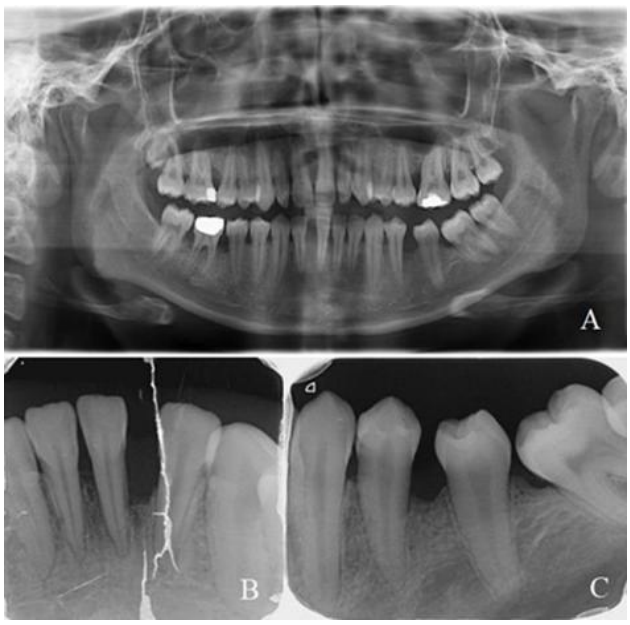

Figure 2: Radiographs before treatment; (A) Panoramic radiography, (B) Periapical radiography of the #31. (C) Periapical radiography of the #34.

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Table 1. Full mouth periodontal measurements at the beginning of the treatment (T0), two years later (T1), and the difference (T1-T0).

	T0	**T1**	**T1-T0**
Plaque Index (%)	65	15	50
Gingival Index	0.45	0.08	0.37
Bleeding on probing(%)	60	18	42
Probing Depth(mm)	5,04	2	3,04
Clinical Attachment Level (mm)	5,17	2,08	3,09
Gingival Recession (#31) (mm)	4	1	3
Gingival Recession (#34) (mm)	5	2	3
Gain of Keratinized Tissue (#31) (mm)	-	-	3
Gain of Keratinized Tissue (#34) (mm)	-	-	3

According to 2017 World Workshop on the classification of periodontal and peri-implant diseases and conditions, the severity of the periodontitis of the patient was determined as Stage III due to clinical attachment loss ≥5 mm, loss of radiographic bone extending to the middle of the root and presence of periodontal tooth loss. Stage III periodontitis complexity was diagnosed due to Class II furcation involvement and probing depth ≥6 mm. A molar-incisor involvement is observed when the extent of the disease is evaluated. The greater destruction compared to biofilm deposits at an early age and bone loss/age ratio above 1% revealed periodontitis grade as Grade C (Papapanau et al., 2018).

The treatment planing included phase I (non-surgical), phase II (surgical), and phase IV (maintanence) periodontal treatments. Scaling and root planing (SRP) were performed in the phase I treatment in four visits and also oral hygiene instructions were given to the patient with soft-toothbrush (Tepe, Sweden) and interdental brush (Tepe, Sweden) during the treatments. The patient was administered metronidazole (Flagyl, France) (500 mg, 3x1) with amoxicillin (Augmentin, England) (500 mg, 3x1) for 7 days during SRP. After 4 weeks from the phase I treatment, PD was detected deeper than 5 mm and BOP was 40%. Full mouth open flap debridement was performed on the areas with a PD ≥5 mm and plaque index <15%. After one week later, the sutures were removed and the wound healed without any problems or infection. FGG operations were applied

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to #41 and #34 at the end of four weeks following flap operations. FGGs were harvested from the right side of the palate and fixed in the recipient bed. Fixed orthodontic treatment was started six weeks after the healing of FGGs. Bonding was preferred instead of banding the molars to decrease plaque-retentive surfaces. Space closure in the anterior region were performed by retraction of mandibular and maxillary incisors using eight ligatures on stainless steel archwire with light continuous force. Arches were well aligned with normal overjet and overbite at the end of two years. Orthodontic treatment still continues. (Figures 3A, 3B, and 3C).

Figure 3: Intra-oral photographs during orthodontic treatment (A) Intra-oral frontal photograph, (B) Intra-oral right buccal photograph, (C) Intra-oral left buccal photograph.

During orthodontic treatment of this patient, bonding was preferred instead of banding the molars to decrease plaque-retentive surfaces. Hereby, the space closure in the anterior region were performed by retraction of mandibular and maxillary incisors using eight ligatures on stainless steel archwire with light continuous force in the present case-report. Arches were well aligned with normal overjet and overbite at the end of two years. The mobility of #41 was decreased to the limits of physiologic mobility during two years of orthodontic treatment. Table 1 shows the periodontal indices during the periodontal treatments and two years follow-up. Gain of keratinized tissue was detected as 3 mm in #41 and #34 (Table 1; Figures 4A and 4B).

Figure 4: Buccal aspect of gingiva after two years (A)#31. (B)#34.

After two years, teeth were aligned, and periodontal health was preserved. Alveolar bone gains were observed in the panoramic film in #16, #21, # 26, #41, #34, and #46 (Figure 5).

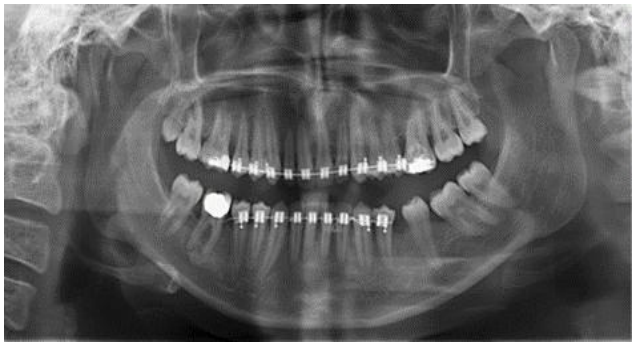

Figure 5: Panoramic radiograph of 2-years following of periodontal treatment

3. Discussion

Pathogenic microflora of the dental plaque may cause periodontal diseases (Pihlstrom, Michalowicz & Johnson, 2005). Therefore, inflammation control is

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achieved by removing the dental plaque with initial periodontal treatment and oral hygiene training (Nayudu et al., 2016). Aggregatibacter actinomycetemcomitans and Porphyromonas gingivalis associated with periodontal infections invaded pocket epithelial cells, dentinal tubules and the biofilm in the mouth forms a reservoir (Collins, Offenbacher & Arnold, 1993) (Teughels et al., 2020). Winkel et al. (Winkel, Winkelhoff, Timmerman, Velden, & Weijden, 2001) reported that patients with subgingival P. gingivalis positive patients at baseline who were treated with AMOX/MET presented approximately half of the percentage of periodontal pockets with over 5 mm after therapy compared with treated with placebo. AMOX/MET may be administered in different dosages (250-500 mg amoxicillin with 200–500 mg metronidazole per usage), in three times per day, from 3 days up to 14 days (Winkel et al,). Teughels et al. (Teughels et al., 2020). concluded that the use of systemic antimicrobials as an adjunct to SRP caused greater PD reduction, CAL gain and BOP reduction, higher percentage of pocket closure, reduction in frequency of periodontal pockets of ≥4 mm. Therefore, in our case the result of the significant impact on severe affected sites by periodontitis, 500 mg amoxicillin (Augmentin, England) and 500 mg metronidazole (Flagyl, France) were administered in three times per a day for seven days during phase I treatment.

Following four weeks of phase I periodontal treatment, full mouth open flap debridement was performed on the periodontal pockets with the depth of ≥5 mm. It was reported that when gingival inflammation is not fully controlled, orthodontic therapy might trigger the inflammation and accelerate the periodontal destruction, causing further loss of attachment (Årtun & Urbye, 1998). Therefore, in our case, during maintenance phase, orthodontic treatment was performed with light forces.

PTM is a common complication of periodontitis that often causes diastema (Brunsvold, 2005) in the anterior region but it rarely involves posterior area (Newman et al., 2012). Most cases of severe PTM necessitate a multi-disciplinary approach as periodontal, orthodontic, and prosthodontic treatments (Chou et al., 2013). There are several case-reports indicating spontaneous correction or reactive positioning of PTM after periodontal therapies (Singh & Deshpande, 2013). It is concluded that 77.8% of sites closed in patients with only small to moderate diastema (<1 mm). In sites with diastema 1 mm, 20% (3 of 15 sites) were closed 4 months following surgery without orthodontic treatment (Gaumet, Brunsvold & McMahan, 1999). In our patient severe diastema, one of the symptoms of PTM, was observed between the #31 and #32, and mild diastema was found between upper central incisor. In this patient, anterior diastema was closed after surgical periodontal therapy and with light forces during orthodontic treatment. Due to the gingival recession of the #34 and rotation of the #35, treatment was planned to close the diastema between the premolars partially with orthodontic treatment.

Soft tissue grafting was suggested for prophylaxis before orthodontic treatment in teeth with less than 2 mm keratinized gingiva (Boyd, 1978). FGG is a favorite method for augmenting keratinized tissue (Shekar, Bhagyalakshmi, Chandrashekar & Avinash, 2017). In our patient, depths of gingival recessions were found 4 mm and 5 mm in the #31 and #34, respectively, following the surgery phase of

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periodontal therapy. Therefore, FGGs were applied to these teeth at the end of four weeks following flap operations and 3 mm keratinized tissue gain is in both teeth.

Melsen et al. (Melsen, Agerbaek & Markenstam, 1989) emphasized the importance of using light forces during movement of teeth with reduced periodontium in case of periodontal support's further loss. Hereby, the anterior space closure was performed by retraction of incisors using eight ligatures on stainless steel arch-wire with light continuous force. Lingual retraction of incisors was reported to improve the labiolingual width of labial gingiva and slight incisal migration of gingival margin when there is absolute control of inflammation and bacterial biofilms (Gkantidis , Christou & Topouzelis , 2010).

Several studies reported that fixed orthodontic treatment is successful in teeth with weak periodontal support (Re, Corrente, Abundo & Cardaropoli, 2000). Orthodontic treatment approaches can help to correct periodontal condition by correction of the dentition into proper occlusal relationship (Bjørnaas, Rygh & Bøe, 1994). In accordance with them, in this case the treatment success was achieved by the comprehensive periodontal treatment and the favorable results were preserved at the end of the two years follow-up. Long-term maintenance of alveolar bone gain was observed according to radiographs. Similar to our case, a one-year follow-up study reported that orthodontic treatment actually improved the saving and restoring deteriorating dentition in patients with severe periodontitis (Re et al., 2000).

In conclusion, control of inflammation with the motivation of oral hygiene, periodontal treatment and application of FGGs in a patient with Stage III, Grade C periodontitis and PTM before orthodontic treatment can main-tain periodontal stability for two years.

Acknowledgements-Remarks

This case report was presented as a poster presentation at the 49th International Scientific Congress of the Turkish Periodontology Association on 27-29 October 2019 in Antalya, Turkey.

Conflicts of interest

The author declares no conflicts of interest related to this study.

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