

SHORT REPORT

Multidisciplinary Treatment Approach for the Localized Gingival Recession: A Case Report

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Gingival recession is the most common mucogingival deformity and it is characterized by the displacement of the gingival margin apically from the cementoamalgam junction (CEJ). Gingival recession can be localized or generalized and can be associated with one or more tooth surfaces. The resulting root exposure is not aesthetically pleasing and may lead to sensitivity and root caries. Additionally, exposed root surfaces are prone to abrasion (1).

Gingival recession has a multifactorial etiology associated with anatomical factors, or physiological or pathological factors. Anatomical factors are fenestration or dehiscence of the alveolar bone, abnormal tooth positioning, aberrant path of tooth eruption and individual tooth morphology. All those anatomical factors may result in a thinner alveolar osseous plate, which may become more susceptible to resorption. Physiological factors may include the orthodontic movement of teeth to positions outside the labial or lingual alveolar plate, subsequently leading to dehiscence formation. Pathological factors consist of bone resorption as a sequel of microbially induced periodontal diseases and in such cases gingival recession can occur as a result of the localized inflammatory processes within connective tissue, characterized by the accumulation of mononuclear cells (1,2).

In addition to the above-mentioned factors, malpositioned teeth, toothbrush trauma, aberrant frenal attachment, occlusal injury, operative procedures and tobacco chewing are recognized as the other etiologic factors for gingival recession (3).

For many years the presence of an adequate zone of gingiva was considered critical for the maintenance of gingival health and for the prevention of progressive loss of connective tissue attachment. It is generally acknowledged that an inadequate zone of gingiva would facilitate subgingival plaque formation as well as the apical spread of plaque-associated gingival lesions (2). The study by Lang and Löe (2) regarding the significance of gingiva for periodontal health concluded that "Two mm of keratinized gingiva is adequate to maintain gingival health", and this expression has been widely quoted as a definition as to what constitutes an adequate width of gingiva for the maintenance of periodontal health.

Patients may have aesthetic concerns due to increased clinical crown height (longer teeth) and in some instances due to the experience of root sensitivity. Biological and functional issues associated with mucogingival problems also dictate the need for treatment. Important functional points in the treatment of mucogingival problems are to stop the progressive recession process and to facilitate plaque control in the affected area (1). Appropriate

mucogingival therapy can also result in the creation of adequate vestibular depth in areas where there is a deficiency. If untreated, gingival recession may progress and can compromise the prognosis of the affected tooth. Furthermore, root surface exposure may result in caries or abrasion, both of which may give rise to subsequent pulpal pathology (4,5).

Different gingival grafting techniques have been used for the treatment of gingival recession. Grupe and Warren (4) proposed a lateral sliding flap or pedicle graft to cover exposed roots and increase the band of available attached gingiva. Nabers (6) described a technique of grafting palatal gingiva to increase the zone of attached gingiva. Attempts to use a free gingival graft to obtain root coverage have also been successful. Recently, guided tissue regeneration was introduced to treat gingival recession, by the use of biabsorbable or nonabsorbable membranes (1).

Mandibular incisor teeth, which have a minimal amount of labial attached gingiva, may be predisposed to periodontal destruction (7). Surgical procedures and sometimes orthodontic treatment have been advocated for the correction of such problems both in the developing and mature dentition (8). This case report describes the multidisciplinary treatment of a patient with severe midline diastema, gingival recession and inadequate attached gingiva at the anterior mandibular region and whose main concern was the unaesthetic appearance. Improvement of the mucogingival status was achieved through a combined approach consisting of periodontal surgery and orthodontic treatment procedures.

Case Report

A 20-year-old female patient, who had periodontal problems and midline diastema between the mandibular central incisors, was referred to the Department of Periodontology for improvement of the cosmetic appearance.

An intraoral examination revealed the presence of aberrant frenal attachment, localized gingival recession, inadequate attached gingiva and chronic gingival inflammation. A prominent midline diastema, malalignment, labial proclination and rotation of the mandibular incisor teeth were also observed. The patient

mentioned that the recession at the anterior region of the mandible had increased during the previous 2 years.

Despite adequate home care, she was not able to provide efficient plaque control of the region. After the intraoral examination, plaque index, gingival index, probing depth and width of the keratinized gingiva were recorded. The mean plaque index score was 1.50, gingival index score was 1.87, probing depth was 1.75 mm and the width of keratinized gingiva was 0. Gingival recession was 3 mm at the vestibule and 1 mm at the mesial side of the right lower central incisor and it was 3 mm at the vestibule and 2 mm at the mesial aspect of the left incisor (Figure 1). As the marginal tissue recession of both teeth extended to the mucogingival junction and a clear attachment loss and tooth malposition existed, classification of the gingival recession was consistent with class III according to Miller's classification (3). Mobility and frenitus were not observed during the intraoral examination.

Aberrant frenal attachment, inadequate vestibular depth, absence of the keratinized gingiva, gingival recession without pocket formation, and plaque accumulation despite effective home care were the indications for a free gingival graft to form an adequate zone of attached gingiva. Sufficient gingival health was obtained with presurgical therapy that included scaling, polishing and plaque control instructions and then periodontal surgery was performed. Following administration of local anesthesia, the recipient site was prepared by making an intrasulcular incision connected to horizontal incisions made mesially and distally from the CEJ. This first incision was extended with vertical releasing incisions in the apical direction into the alveolar mucosa. At the donor site, a free gingival graft was dissected with a No. 15 blade, and care was taken to ensure to obtain a graft with the thickness of 1.5 mm. The graft was placed over the denuded roots. The graft was sutured (Figure 2) and a periodontal dressing was used over the surgical sites. The sutures were removed after 10 days and wound healing was normal.

Three months after the surgery, the width of the keratinized gingiva was 7 mm at the right incisor tooth and 6 mm at the left one. Gingival recession of the right lower central incisor tooth at the vestibule side and mesial side was 3 mm and 1 mm, respectively. It was 3 mm at the vestibule and 2 mm at the mesial of the left incisor



Figure 1. Mucogingival problems on the labial aspect of the lower incisors. Note the gingival recession, inadequate keratinized gingiva and aberrant frenal attachment.



Figure 2. Appearance of the sutured graft.

tooth (Figure 3). The patient was referred to the Department of Orthodontics for further esthetic improvement. The orthodontic treatment plan included correction of the rotation and proclination of the mandibular incisor teeth and closure of the midline diastema. Orthodontic therapy was considered important not only for aesthetic appearance but also for the improvement of the patient's plaque control efficiency.

The mandibular teeth were bonded with edgewise brackets and 0.016-inch nitinol arch wire was used to correct the rotation and malalignment of the incisor teeth. Following the leveling phase, 0.016 x 0.016-inch stainless steel arch wire with a T-loop was inserted and the loop was activated at 3-week intervals to close the diastema (Figure 4). During the closure of the space between the central incisor teeth, a significant increase in



Figure 3. Appearance of the same region 3 months after the free gingival graft.



Figure 4. Activation of the 'T-loop' to close the midline diastema.

the zone of attached gingiva and the formation of creeping attachment was observed. To foster paralleling of the roots, a finishing arch was used and this was left in place for 3 months to verify stability. At the end of the orthodontic treatment, a lingual retainer was bonded to prevent relapse of the case and the clinical records were repeated. It was determined that the mean plaque index

was 1.12, gingival index was 1.25 and probing depth was 1.75. Width of the keratinized gingiva was 10 mm for the right incisor tooth and 9 mm for the left one 6 months following the orthodontic treatment. Gingival recession of 0.5 mm was only observed at the vestibule side of the left incisor (Figure 5).



Figure 5. Reconstruction of periodontal structures following the orthodontic treatment.

The patient, provided with combined periodontal and orthodontic procedures, was extremely pleased with the outcome of this combined treatment. A 6-month recall was scheduled after completion of the orthodontic treatment.

Discussion

Mucogingival therapy includes increasing the dimensions of the gingival tissues to stop or prevent recession, to facilitate plaque control, and to improve aesthetics and to reduce or eliminate root sensitivity (1).

Etiology and the contributing factors are important when deciding on appropriate treatment procedures for patients with localized gingival recession. If the gingival recession is due to the malposition of teeth, orthodontic treatment needs to be considered with or without periodontal surgery (9). In the case presented, the causes of the gingival recession were inadequate width of keratinized gingiva, inadequate vestibular depth, coronally attached frena, midline diastema and labial proclination of mandibular incisors. Due to the existence of multiple mucogingival problems, it was decided to use a free gingival graft to obtain root coverage and to form functional attached gingiva. Following the surgery procedures, orthodontic treatment was applied to close the diastema and to realign the mandibular incisor teeth. Treatment of malalignment was crucial to achieve an

acceptable aesthetic appearance and to reduce plaque accumulation by easing self-home care. During the orthodontic treatment, more coronal replacement of the gingival margin and a further increase in the width of the attached gingiva occurred as the incisors were retracted in a more suitable condition with regard to the alveolar bone. During the closure phase of the diastema the mandibular incisors, which were moved together, seemed to push the gingiva and the of formation new papillae occurred as the space diminished.

It was observed that the width of the keratinized gingiva increased 7 mm for the right incisor tooth and 6 mm for the left one after the free gingival graft and a further 3 mm increase in the width of keratinized gingiva was observed during the orthodontic treatment. Several authors have evaluated the changes in the keratinized or the attached gingiva during orthodontic treatment, but none of them applied a free gingival graft. These studies had conflicting results. Batenhorst et al. (10) measured the width of the attached gingiva in 2 adult rhesus monkeys during facial tipping and extrusion of incisors. The attached gingiva increased in all experimental teeth. Dorfman (7) determined the changes in the width of the keratinized gingiva of fully treated orthodontic patients. He found a significant correlation between the direction and magnitude of tooth movement and the visible changes in the gingiva. A minimal or small labial movement was noted with a decrease in the width, while

an increase was concomitant with significant lingual positioning of the lower incisor teeth. Similarly, Boyd (9) pointed out that lingual positioning of teeth with excessive proclination and gingival recession may improve their prognosis when lingually positioned and may demonstrate an increase in the zone of the keratinized gingiva. In the case presented, the augmentation of the keratinized gingiva corresponds to the findings of Batenhorst et al. (10), Dorfman (7) and Boyd (9), who found an increase in the width of keratinized gingiva due to the different orthodontic tooth movement. However, these findings are in contrast with the results of Coatoam et al. (11), and Trossello and Gianelly (8). Coatoam et al. (11) concluded that when keratinized gingiva was lacking initially, none was formed by orthodontic treatment. Trossello and Gianelly (8) also found no difference in the width of the attached gingiva between orthodontically treated patients and patients in a control group.

Several authors have described limited coronal regrowth following periodontal surgery. Lindhe and Nyman (5) reported 1 mm regrowth during an observation period of 10-11 years after an apically repositioned flap procedure. Some authors have reported the repair of chronic periodontal bony defects following the orthodontic tooth movement. Geraci et al. (12) observed the coronal attachment of new connective tissue during tooth movement into a periodontal vertical defect. In contrast, Polson et al. (13) found no coronal reattachment of the attachment apparatus but demonstrated a reduced angular bony defect. In the presented case, a significant coronal reattachment of 3 mm was observed during the orthodontic treatment period. The formation of excessive creeping attachment in a short time period was thought to be due to closure of the diastema and lingual movement of the incisors. Andlin and Bodin (14) reported that the spontaneous change of the tooth position in the bucco-lingual direction that often occurs during the development would affect the gingival height. Furthermore, some authors revealed that a tooth facially positioned often shows an alveolar bone dehiscence with a thin covering soft tissue, but when moved in a lingual direction into a more appropriate position within the alveolar process, the tissue dimensions on the facial aspect would increase in thickness, which in turn could result in an increased height of the free gingiva (15). The effect of combined treatment including a free gingival graft and orthodontic therapy on the width of attached gingiva has not been previously reported in the

dental literature. The aim of our report was to present the significant increase in the width of the attached gingiva and improved status of the gingival recession in a relatively short time period, as a result of orthodontic treatment following periodontal surgery. We think that lingual movement of the incisors resulted in an increase in the attached gingiva due to the coronal migration of the soft tissue margin and also due to possible increased bone height.

Experimental investigations have revealed that labial bone would reform in the area of a dehiscence when the tooth is retracted towards a proper positioning of the root within the alveolar process (12,15). It is therefore likely that the reduction in recession seen at a previously inappropriately positioned tooth, when moved into a suitable position in the alveolar process, is also accompanied by bone formation.

Orthodontic tooth movement is a stimulating factor in bone apposition. The stimulus generated through orthodontic force gives rise to a dramatic increase in the number of mitoses. Karring et al. (15) demonstrated, in a study involving dogs, that lingual movement of maxillary incisors could result in bone regeneration. In the present report, the improved periodontal status is considered to be associated with the orthodontic movement of teeth.

In the current practice of periodontics, clinicians are faced with the challenge of not only addressing the biological and functional problems present in the periodontium, but also of providing therapy that results in acceptable aesthetics. The purpose of this report was to describe the multidisciplinary treatment of a patient with severe mucogingival problems and malalignment of the lower incisors. It was observed that orthodontic treatment following surgical intervention improved the status of periodontal structures. In the presented case not only were the biological and functional problems solved but also an aesthetic improvement was attained.

Attached gingiva is not static and may respond to alterations in the functional environment of teeth. This case report confirms this evidence and suggests the consideration of multidisciplinary treatment approaches for better outcome. However, similar studies conducted on large patient groups are needed to determine the exact mechanism of clinical improvement and the involvement of both the soft and hard tissue components of the periodontium.

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