

Forced eruption for gingival margin leveling in restorative procedures

AN, Tien Li. Forced eruption for gingival margin leveling in restorative procedures. Oral Sci., Jan/Apr. 2010, vol.2, no.1, p. 37-41.

Tien Li AN*

* Temporary Professor, Discipline of Preventive Orthodontics, Department of Dentistry, Faculty of Health Sciences, University of Brasília, Brasília, DF, Brazil.

ABSTRACT - Adjunctive minor orthodontic movement generally is helpful for rehabilitation in adult patients, mainly in the region where esthetics present strong impact during functional dynamics of the mouth. In these cases, only restorative or periodontal procedures are unable to achieve pleasant outcomes. The present case describes a patient who sought for treatment because of unleveled gingival margin in the maxillary anterior region associated with worn restorative crowns. Based upon the principles of bone and gingival remodeling capacity in response to orthodontic movement, maxillary incisors were extruded for gingival leveling before restorative crowns were replaced. As results, satisfactory outcomes were evidenced, showing that effective forced eruption procedures sometimes are necessary in rehabilitation therapeutics.

KEYWORDS - Forced eruption, gingival margin, adjunctive orthodontics.

Received January 30, 2009
Accepted February 25, 2009

Introduction

Besides regarding teeth as an important part of chewing, their esthetic impact should not be neglected. According to the concept of oral health-related quality of life, good oral health is no longer seen as the mere absence of oral disease and dysfunction, but includes the absence of negative impacts of oral conditions on social life, and a positive sense of dentofacial self-confidence (1). Following this concept, the achievement for an improved dental esthetic has challenged dental science to look at this issue with an organized and systematic manner, with the participation of several different dental disciplines.

In the past, less emphasis has been placed on the interrelationship between orthodontics, periodontics and esthetics, as most adolescent patients who are not missing teeth, have a healthy periodontium, and have not worn or abraded their teeth, a well-fitting occlusion is esthetically pleasing when the patient smiles (2). However, the

demand for a natural smile led other dental disciplines to refer orthodontic adjunctive procedures to offer a comprehensive dental care so that both esthetic and functional aspects can be achieved. This group of adult patients generally have no ideal tooth morphology and periodontal health, worn or abraded teeth, fibrotic tissue, missing papillae, and uneven crown lengths, which jeopardize the esthetic appearance of the teeth and cannot be solved solely by restorative or periodontal procedures (2,3).

The present case report describes a patient that presented unleveled gingival margin in the maxillary anterior teeth, associated with worn restorative crowns, which was impossible to achieve a good esthetics without minor orthodontic movement. Besides, some biological parameters and biomechanics concepts belonged to orthodontic movement were discussed as the basis for the present therapeutic protocol.

Case Report

Diagnosis and treatment plan

A 40-years-old female patient sought for treatment complaining of unfavorable esthetics presented by maxillary anterior teeth. By examination, the patient showed Angle Class II malocclusion, Division 1, subdivision, with Class II relationship at the right side, and absence of lower first molars. Besides, good alignment was found in both maxillary and mandibular arches, acceptable overjet and overbite were evidenced. Frontally, an unlevelled gingival margin of maxillary anterior region can be noted, specifically, the gingival margin of right central incisor was pronouncedly high. As patient was not motivated to be submitted to orthodontic comprehensive treatment and the occlusion was acceptable, only restricted treatment objectives were proposed, that is, leveling of gingival margin and replacement of the crowns in the upper anterior region.

The treatment options available for this case were either surgery or forced eruption. The surgical procedure would be directed at left central incisor in order to raise the gingival margin to approximate the level of the tissue on the adjacent teeth. But this option was rejected because of the already exaggerated length of the right central incisor and the patient's high smile line. Based upon the favorable root crown proportion showed by the radiograph (Figure 1), forced eruption was selected to

change the position of the gingival margin of central right incisor and to shorten its clinical crown.

Treatment progress

Orthodontic braces were attached to the teeth, a 0.019"x0.025" stainless steel passive wire was fabricated and inserted with approximately 1 mm distant from the bracket, then, an elastic ligature was attached from bracket to orthodontic wire for activation. In this wire, it was soldered in the direction of the forced eruption a stop pin so that the elastic could be stable (Figure 2). When the right central incisor reached the level of the wire, step down bend was performed in the wire for reactivation. After three months, the forced erupted tooth presented leveled gingival margin in relation to adjacent central incisor. Although the treatment objective was accomplished, it was noted that the right lateral incisor showed the same gingival level in relation to central incisor, then, braces were attached to left central and right lateral incisor to extrude right lateral incisor for approximately 1 mm (Figure 3), which was accomplished in 1 month of activation. After activation phase, teeth were stabilized with the same wire for another 2 months (Figures 4 and 5) before final prosthetic procedures (Figures 6, 7 and 8). No periodontal surgery was needed at the end of treatment.



Figure 1. Initial radiograph showing crown/root proportion of the compromised right central incisor. Note that restorative material is localized beyond the level of the alveolar crest.



Figure 2. Initial frontal view at the time of appliance installation and force activation. The wire thickness was 0.019"x0.025", and in the direction of forced eruption a stop pin was soldered so that the elastic ligature could be stable.



Figure 3. Three months after the forced eruption. Note the step down bend made for additional activation. Note the equal gingival margin level of right lateral and central incisors.



Figure 4. Treatment at fourth month when most of anterior teeth were involved.



Figure 5. Radiograph showing the root displacement and alveolar bone remodeling after four month of forced eruption.



Figure 6. Frontal view at the end of prosthetic procedures. The gingival level of anterior region was not uniform, but it maintained an acceptable relationship.



Figure 7. Radiograph taken at the end of prosthetic procedure.



Figure 8. Photograph showing the smile, with still unlevel, but with little esthetic impact, gingival margin.

Discussion

For planning orthodontic procedures, some concepts should be borne in mind, namely, the concept of biological responses and the biomechanical principles of orthodontic movement. When orthodontics aimed to be adjunctive with other procedures, not always ideal treatment plan must be executed, but costs and benefits should be weighted. In the present case, the patient showed a Class II malocclusion, however, the only chief complain presented was the unfavorable esthetics showed by both unleveled gingival margin and worn fixed crown. Because of the lack of motivation in submitting to orthodontic comprehensive treatment, only minor tooth movement was performed to deal with the chief complain of the patient.

In this case, forced eruption was opted because of the well-known effects that this procedure would provoke. Literature evidence showed that remodeling of the alveolar bone and gingival tissue would occur under tooth movement. According to Oppenheim (4), under application of light and continuous force directed occlusally, alveolar bone would migrate concomitantly. In this approach, the periodontal ligament is tensed and osteoblasts are induced to deposit new bone. Similar migration by attached gingival tissue was noted by Batenhorst et al. (5). Based on this rationale, forced eruption was applied by Ingber (6) for treatment of one-wall and two-wall bony pockets, during forced eruption for elimination of an intraosseous pocket, the relationship between cemento-enamel junction and the bone crest is maintained, that is, by applying this light force, the bone follows the tooth.

With regard to orthodontic biological responses, forced eruption can be categorized into two main types, namely, slow extrusion and fast extrusion. Slow extrusion is characterized by the migration of gingival tissue and bone that alter the alveolar crest level, whereas fast extrusion provoke predominantly migration of tooth without altering alveolar crest level. In both types, the magnitude of force is similar, however,

interval of activation protocol would differ each other (7). In slow extrusion, the activation protocol establishes 1mm of extrusion per month, whereas in the fast extrusion, the activation extrude 2 to 3 mm at first two weeks of treatment (7). In the present case, only slow extrusion was desirable as both the crest level and gingival margin should be altered for esthetic purpose. According to Kokich and Spear (8), when assessing gingival form, the orthodontist should evaluate four criteria. First, the gingival levels over the two central incisors should be at the same height. Second, the gingival margin over the lateral incisor should be positioned about 0.50 mm coronal to the central incisor. The gingival margin of the canine should be at the same height as the central incisor. The third aspect to evaluate is the contour of the labial gingival margin of each tooth. The gingival contour should follow the contour of the cemento-enamel junction. The last criterion to evaluate is the interproximal papilla. Ideally, tooth contact forms half of the interproximal contact and the papilla forms the other half. At the end of treatment in the present case, it was not possible to level totally the gingival margin of anterior teeth, as the gingival margin, from canine to canine teeth, at right side is different from the left side. So, the leveling was performed until acceptable esthetic appearance is reached.

With regard to biomechanical principles, two types of appliance for forced eruption can be classified, depend on the quality of the force. Removable appliance is cleaner, presents good anchorage and need less chairtime for adjustment, but it depends essentially on the cooperation of the patient and promotes little control on the root movement and it deliver intermittent force. Fixed appliance, in contrast, presents good control on the crown and root movement, delivers constant force, doesn't demand patient's cooperation, but requires monitoring in the oral hygiene and the force is dissipated on the adjacent teeth (9). In this case, fixed appliance was opted because of its advantage with regard to the movement control, force frequency and patient cooperation.

Aiming to minimize the reaction of the force system generated during activation, teeth adjacent to the point of force application were not bonded with braces initially, so that the inter-bracket distance could be increased and, consequently, the flexibility of the wire (Figure 2 and 3), also the dissipating reaction force could not affect the adjacent well positioned teeth.¹⁰ At the second phase of treatment, braces were attached for stabilization and for slight forced eruption of right lateral incisor. A thick 0.019"x0.025" stainless steel wire was chosen from the beginning to promote good quality in the anchorage segment (10). Care should be taken during wire bending so that it could be inserted passively in the slot of braces. With regard to the force direction, it should be orientated vertically, even the tooth would present trend to rotate lingually during the extrusion. During tooth extrusion, the crown length should be reduced, and the occlusal contact eliminated. Radiograph control is a demand during the follow up of the case.

In general, the present case succeeded well as forced eruption avoided a surgical procedure and restored the esthetic relationship among anterior teeth, finally, the periodontal health was maintained as well.

Resumo

AN, Tien Li. Erupção forçada para nivelamento da margem gengival em procedimentos restauradores. Oral Sci., Jan/Apr. 2010, vol.2, no.1, p. 37-41.

Um movimento ortodôntico pequeno e auxiliar é geralmente útil para a reabilitação em pacientes adultos, principalmente na região onde a estética apresenta forte impacto durante as dinâmicas funcionais da boca. Nestes casos, somente procedimentos restauradores e periodontais são incapazes de conseguir resultados adequados. O presente caso clínico descreve um paciente que procurou por tratamento por causa do desnivelamento da margem gengival na região superior anterior associada à coroas protéticas desgastadas. Com base nos princípios de osso e de capacidade de remodelação gengival em resposta ao movimento ortodôntico, os incisivos superiores foram extruídos para nivelamento gengival antes que as coroas protéticas fossem substituídas. Resultados satisfatórios foram atingidos, mostrando que às vezes procedimentos de erupção forçada são necessários durante a terapia reabilitadora.

Palavras-chave - Erupção forçada, margem gengival, ortodontia auxiliar.

References

1. Ingleheart M, Bagramian RA. Oral health-related quality of life. Chicago:Quintessence; 2002.
2. Kokich VG. Esthetics: the orthodontic-periodontic restorative connection. Semin Orthod 1996;2:21-30.
3. Spear FM, Kokich VG, Mathews DP. Interdisciplinary management of anterior dental esthetics. J Am Dental Assoc 2006;137:160-169.
4. Oppenheim A. Artificial elongation of teeth. Am J Orthod Oral Surg 1940;26:931-42.
5. Batenhorst KF, Bowers GM, Williams JE. Tissue changes resulting from facial tipping and extrusion of incisors in monkeys. J Periodontol 1974;45:660-8.
6. Ingber JS. Forced eruption: Part I. A method of treating isolated one and two wall infrabony osseous defects – rationale and case report. J Periodontol 1974;45:199-206.
7. Janson MRP, Passanezi E, Janson RRP, Pinzan A. Tratamento interdisciplinar II – estética e distância biológica: Alternativas ortodônticas para remodelamento vertical do periodonto. R Dental Press Ortodon Ortop Facial 2002;7:85-105.
8. Kokich VG, Spear FM. Guidelines for managing the orthodontic-restorative apatient. Semin Orthod 1997;3:3-20.
9. Cuoghi OA, Bertoz FA, Mendonça MR, Santos ECA, An TL. Extrusion and alignment of an impacted tooth using removable appliances. J Clin Orthod 2002;36:379-83.
10. Proffit WR. Contemporary orthodontics. 3rd ed. St. Louis: Mosby; 2000.