

Orthodontic management of a periodontally - compromised adult patient

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ABSTRACT

Background: Periodontally – compromised adult patients present with multiple problems of malocclusion, esthetics, smile and psychological stress. Orthodontic treatment of such patients is not contra-indicated but needs to follow special considerations, certain precautions, and determination of specific, realistic, and achievable treatment objectives.

Methods: A periodontally – compromised adult female patient was treated with a fixed orthodontic appliance of 0.022x0.028" Roth prescription, using lighter forces and sliding mechanics. A regular phase of oral hygiene maintenance for improving the periodontal status was followed during the treatment. Permanent retainers were placed in both arches to maintain the results.

Results: Orthodontic treatment helped to close the spaces in the anterior segment; achieve acceptable overjet and overbite; well – aligned arches; a harmonious occlusion, and good periodontal health. Improved lip relationship, smile, facial esthetics and improved psycho-social confidence were achieved.

Conclusion : Orthodontic treatment helps to improve function, facial esthetics, smile and psychological confidence of an adult patient. Regular maintenance of oral hygiene and healthy periodontal status is a must for tooth movement. Lighter and controlled forces should be used. Adequate rest periods should be provided during treatment. Permanent retainers should be placed and regular follow up to maintain healthy periodontal status leads to longevity of the periodontium.

Keywords: Adult orthodontics - periodontal health - controlled forces - sliding mechanics

RESUME

Fond : les problèmes periodontaux chez des patients adultes ont des multiples repercussions de malocclusion, d'esthétique, de sourire et de tension psychologique. Le traitement orthodontique de tels patients n'est pas contre-indiqué mais doit suivre des considérations spéciales, de certaines précautions et une détermination des objectifs de traitement spécifiques, réalistes et exécutables.

Méthodes : Une patiente adulte compromise a été traitée avec un appareil orthodontique fixé de 0.022x0.028" suivant la prescription de Roth utilisant des énergies légères et la mécanique. Une phase régulière de maintenance d'hygiène orale pour améliorer le statut periodontal a été suivie pendant le traitement; et les appareils dentaires ont été placés dans les deux arcs pour maintenir les résultats.

Résultats : le traitement orthodontique a permis de fermer les espaces dans le segment antérieur, d'accomplir un surjet acceptable; de bien aligner les arcs et d'obtenir une occlusion corrigée. Ce traitement a permis d'obtenir un rapport des lèvres amélioré, un sourire, l'esthétique du visage et la confiance psychosociale.

Conclusion: Nos résultats montrent que le traitement orthodontique permet d'améliorer la fonction, l'esthétique du visage, le sourire et la confiance psychologique. La maintenance régulière d'hygiène orale et de l'état de santé periodontal sont recommandés pour le mouvement des dents. Les énergies légères devraient être des issus de recours. Les périodes de repos adéquats sont recommandés au cours du traitement. Les appareils dentaires et un suivi régulier sont des pré-requis pour maintenir l'état de santé periodontal ce qui permettrait une longévité du periodontium.

Mots clés: orthodontie adulte - santé de periodontal - forces contrôlées - le fait de faire glisser la mécanique.

INTRODUCTION

Dentofacial esthetics is the main driving force in the adolescent & adult population as a cause of seeking the orthodontic treatment. The number of adults seeking orthodontic treatment has increased considerably in the last 2-3 decades (1). 20-25% of orthodontic patients are reported to be adults & this trend is increasing due to the society becoming more esthetic & health conscious (2). Primary motivating factor in adults is a desire to improve their dental & facial appearance (3,4).

Adult patients are grouped in two different groups (5):
1. Younger adults (under 35, often in their 20's) who desired, but could not receive orthodontic treatment during adolescent period.
2. An older group, typically in their 40's or 50's who have other dental problems & need orthodontics as part of larger treatment plan involving

multiple dental disciplines. The major finding in adult patient is that they are more concerned about improving their appearance & social acceptance than function. Studies have proved that orthodontic treatment, besides improving dental esthetics, also has a significant impact on the psychosocial aspect of the patients' life (6). It has been also found that about 80% of orthodontic patients seek treatment due to esthetic concerns rather than for dental health & function (7).

More & more adults are now coming to the orthodontists for treatment due to the increased awareness; improvement in designs of appliances; availability of tooth-coloured braces; improved financial capacity; increased availability of qualified orthodontists; media campaigns etc (8). Also, since adults have to be in social circle for most part of their day, they are more concerned about their appearance. To add on, in some countries, eg Rwanda, the third – party assurance to pay for orthodontic treatment is also a motivating factor for adults seeking this treatment.

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Many of the adult patients get affected with malocclusion due to their neglected periodontal health, leading to bone loss around the teeth & ensuing pathological migration. Special attention must be given to the periodontal status of adults because they are more likely to be susceptible to or have already suffered from periodontal disease (9). Orthodontic treatment is no longer a contraindication in the therapy of severe adult periodontal disease. In fact, orthodontic treatment could help in salvaging & restoring a deteriorated dentition. Advanced periodontal disease is primarily characterized as severe attachment loss & a reduction of alveolar bone support, & the periodontal condition is usually characterized by tooth mobility, pathologic migration, extrusion of teeth, appearance of spacing, & marginal gingival recession. In many cases, this functional discomfort is usually accompanied by deteriorated esthetics in the anterior dental region, which is reflected on the facial soft tissues (10,11,12).

Orthodontic treatment for realignment of migrated periodontally involved teeth should only be started after control of the periodontal inflammation has been achieved (13). In a motivated patient who responds well to the initial periodontal therapy, the adult orthodontic treatment plays a positive & successful role to provide appreciable significant improvement in terms of both function & appearance, & with a satisfactory long-term prognosis (14). Good oral hygiene at home & professional maintenance visits are important during & after active orthodontic treatment (14,15).

In the periodontally compromised adult patient presented here, a successful result was achieved with improvement of oral hygiene, periodontal prognosis, esthetics, masticatory function, & self-confidence.

CASE HISTORY

A 35 years, 6 months old, married, female patient reported to the Dental Dept in November 2010, with the complaints of wide spaces between her teeth; teeth coming outwards; inability to close lips; hiding of smile; escape of saliva while speaking; & less social contacts. The patient's chief complaint was to improve her esthetics because her "teeth were spaced & did not look good". She had visited a general dental surgeon in the past, who advised her to extract all 8 incisors & replacement with fixed bridges. She had also received composite layering on labial surfaces of her upper central incisors, the purpose of which was not clear. Her main concern was to improve her esthetic appearance by closure of gaps & correcting the alignment of teeth.

DIAGNOSIS

On clinical examination, it was found that she had a symmetric face & a convex facial profile. At rest position, there was almost 50 % of incisal exposure. The lips were incompetent, & she was showing hyperactivity of lower

& upper lips to close the lips. The facial height was longer than normal & a mild vertical growth pattern was noted. Intra-orally, she presented with all the permanent teeth upto second molars, with extruded upper third molars, subsequent to missing lower third molars; large diastemas in upper & lower anterior segments; & pathologically drifted incisors due to generalized periodontitis. The upper & lower incisors had flared labially contributing to a bimaxillary proclination situation. The buccal occlusion was Angle's Class I molars & Class I canine relations on both the sides. The overjet was increased with variable overjet in incisal region; & an increased overbite depth. Labial surfaces of upper central incisors were having composite layering. Lower incisors were striking the palatal surfaces of upper incisors, leading to functional traumatic occlusion, which also contributed to pathological migration of teeth (Figs 1).

Her periodontal condition was poor, with gingival recession in many areas, especially in the upper & lower incisal region. There were generalized deposits of plaque & calculi also, due to poor oral hygiene. No active caries lesion was present. There was no significant medical history of any disease which may have contributed to periodontal disease. The pocket depth ranged from 3 – 6 mm in different areas of dentition.

Pre-treatment diagnostic records involving upper & lower study models; OPG, lateral cephalogram, & extra- & intra-oral photos were obtained. OPG examination showed generalized horizontal bone loss of more than 50 % in incisal region, but lesser in the bone loss in buccal region. Lateral cephalogram showed bimaxillary proclination of the incisors & increased overjet & overbite (Figs 3, left column).

She was advised for 1. A strict oral hygiene schedule; 2. Frequent professional oral prophylaxis sessions; 3. Upper & lower fixed orthodontic appliances; 4. Permanent retainers; 5. Continued oral prophylaxis & oral hygiene maintenance after completion of active orthodontic treatment, & a regular follow-up every 3 months for at least next one year. Informed consent was obtained from her, mentioning the possibility of root resorption; more bone loss around the teeth; loosening of some teeth during orthodontic treatment; loss of some teeth if bone loss continues; & worsening / reappearance of periodontal disease if oral hygiene is not maintained.

Treatment Objectives:

1. Rigorous oral hygiene maintenance & frequent professional oral prophylaxis sessions to control the periodontal condition were planned.
2. Closure of spaces in anterior region using light forces
3. Reduce the incisors protrusion by retraction of incisors.

4. To reduce the overjet & achievement of normal overbite
5. Achievement of an acceptable normal occlusion & function
6. Eliminate primary & secondary occlusal trauma by providing a functional occlusion
7. Improvement in esthetics, smile & lips-relationship.



Figure 1: Pre-treatment intra-oral views

Treatment Planning:

The key element in orthodontic management of adult patients with periodontal complications is to eliminate or reduce plaque accumulation & gingival inflammation. A rigorous oral hygiene schedule & professional prophylaxis was planned before start of treatment, which had to be maintained post – treatment also. A 0.022x0.028" Roth prescription of brackets was selected as the fixed orthodontic appliance, so that there is adequate clearance between bracket slots and arch wires for sliding mechanics during space closure and retraction, without compromising the wire – stiffness. Use of lighter forces was planned. Upper & lower fixed retainers were to be placed at the end of active phase of orthodontic treatment.

Treatment Progress:

The treatment was started with professional oral prophylaxis & strict oral hygiene maintenance schedule for 2 months from November 2010 to January 2011, to

resolve all active gingival disease & to create a conducive environment for starting fixed orthodontic treatment.

In the end of January 2011, the fixed orthodontic appliance of 0.022"x0.028" Roth prescription was placed on her upper teeth, & 0.014" NiTi wire was placed. Lower fixed orthodontic appliance was placed after 2 weeks & a multistranded wire was ligated. After one month, light forces were placed to initiate the closure of gaps between the incisors. For that purpose, an active fig-of-8 steel ligature was placed on lower incisors; while a long E-chain activated by ligature wire was placed for space closure of left side incisal segment in upper arch. Later on, after one month, a long E-chain activated by ligature wire was also placed for space closure of right side incisal segment in upper arch.

Spaces in upper & lower incisal segments were closed in 4 months time with the use of controlled, light forces. Then, in May 2011, the 0.018" stainless steel (s.s.) arch wires of Beggs' design having intermaxillary circles distal to lateral incisors & moderate amount of curve of spee (COS), were placed in both the arches inserted in the round tubes on anchor molars for easy distal sliding of arch wires during incisal retraction. Long elastic – chains were attached from molar hooks, which were activated by attaching the ligature wires to the intermaxillary circles in all the 4 quadrants of dental arches. It helped us to apply lightest possible forces (approx. 30 gm / side) to initiate the retraction of upper & lower incisors to reduce the proclination of teeth, & to reduce the overjet. The COS helped to achieve the bite opening from this stage onwards. Strict oral hygiene protocol & regular professional prophylaxis were followed at every 3 months interval.

The monthly follow – ups; activation of forces; & mild accentuation of COS in both arch wires helped to achieve the space closure in both the arches in 3 months time. Then, the upper & lower arch wires were removed, & both the dental arches received Fig-of-8 ligations to allow natural settling of the teeth. Patient was advised to come after one month for regular follow up. But, the patient had to go out of country on a mission posting & she returned after 5 months. The brackets on left upper central incisor had become loose & some spaces reappeared between the central incisors. The bracket was re-fixed & 0.016 NiTi wire was placed, & professional prophylaxis was performed. She again came after approximately 5 months, & this time the brackets on right upper central incisor had become. The bracket was re-fixed & 0.016 NiTi wire was continued. Active fig-of-8 ligature wire was placed to close the gaps in upper central incisal region. Lower s.s. arch wire was placed after incorporating root uprighting bends in incisal region. This mechanics was maintained for both arches for next 4 months. Taken positively, such long gaps were actually beneficial, as they acted as good rest periods for the reorganization of the tissues around the orthodontically moved teeth.

Then the patient expressed her desire to remove the appliances. The arch wires were removed & fig – of – 8

was done in both arches to achieve a natural settling of dental arches. It was followed by placing 4-to-4 fixed lingual retainers in both arches for stabilizing the achieved results in August 2012, (Fig 2). The patient was advised to follow proper oral hygiene protocol & regular visit to dental clinic every 2 -3 months interval. Post – treatment diagnostic records including study models, lateral cephalogram, OPG & intraoral & extraoral photographs were obtained (Figs. 2, 3). The photos & radiographs show the drastic improvements in dental alignment & occlusion of the patient (Figs. 3).



Figure 2: Post-treatment intra-oral views

Patient was very satisfied, pleased & motivated at the time of removal of her braces. When she was followed – up last in March 2013, she was highly motivated for maintenance of oral hygiene; satisfied; & presented with good orthodontic & periodontal status.

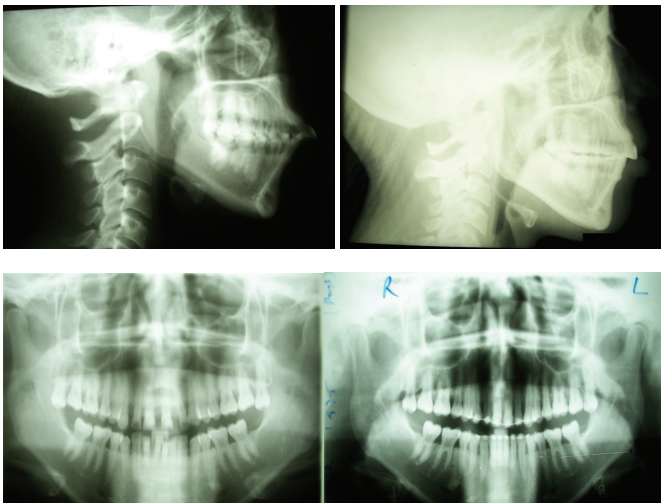


Figure 3: Upper row: pre-treatment lateral cephalometric view (left); post-treatment lateral cephalometric view (right). Lower row: pre-treatment OPG view (left); post-treatment OPG view (right);

Treatment Results:

After an active orthodontic phase of 20 months, the spaces between her upper & lower incisors were closed; & the incisors were retracted to achieve acceptable overjet & overbite relation. Clinical examination revealed well – aligned arches, a harmonious occlusion, and good periodontal health. Improved lip relationship, smile, and facial esthetics were achieved. Patient's cooperation in oral hygiene maintenance was satisfactory. Patient was very satisfied with the treatment and has improved psychosocial confidence.

DISCUSSION:

Periodontal preparation is a very important phase before starting the orthodontic treatment in periodontally – compromised patients. In such cases, it is more important to decide, which treatment objectives should be obtained & what the biological costs are. The main emphasis is to reduce osseous defects, increase tooth longevity, facilitate patient to improve & maintain oral hygiene on a long – term basis, & improve self – confidence (13). Therefore, one should strive to obtain satisfactory functional occlusion with anterior & canine guidance. This philosophy will result in less horizontal body movement, less treatment time (& consequently less root resorption risk) with improved facial esthetics & increase in self-confidence, while obtaining reasonable static anteroposterior relationships of the dental arches (13).

Orthodontic treatment is no longer a contraindication in the therapy of severe adult periodontal disease, and an aligned dentition helps in the maintenance of a healthy periodontal status after orthodontic treatment (10). It is important to identify patients who are susceptible to the more severe manifestation of the disease & to control an existing disease before starting a treatment involving comprehensive orthodontics (16). Tissue damage, particularly root resorption, should be kept to a minimum. The root length & the nature of the periodontal support will influence the force system (9).

Previous reports have demonstrated that, with adequate plaque control, teeth with reduced periodontal support can undergo successful tooth movement without compromising their periodontal situation (9). In the present case, initial periodontal conditions were improved by scaling & root planing before the start of the orthodontic treatment. This included scaling & root planning in all 4 quadrants. A 2-month observation period before appliance installation helped us to judge the patient's cooperation in oral hygiene maintenance, & to ensure that the tooth movement would occur in a healthy periodontal environment (14). If this had not been done, an orthodontically applied force could enhance the gingival inflammation & could be destructive to supporting tissues. Periodontal treatment & the patient's cooperation in oral hygiene were also continued as supportive therapy.

Adult patients exhibit more desire for esthetic appliances & are more concerned about social acceptance & hesitation in accepting visibility of fixed appliances. Tayer & Burek (17) found that nearly 74% adult patients indicated as having an initial fear concerning peer reaction to their treatment. Also, it has been found that the expectations of adult patients are usually high & the limitations of orthodontic treatment must be explained at the beginning of treatment, in order to arrive at realistic treatment objectives (2,18,19).

A viable periodontal ligament is important for cell proliferation on application of the orthodontic forces. There is a reduction in periodontal ligament vascularity with aging & insufficient source of preosteoblasts (20). It is mandatory to use lighter, controlled force levels in adults, because the heavier forces result in vascular compression & necrosis of blood vessels of the periodontal ligament. There is high-risk of iatrogenic damage to the periodontium with uncontrolled forces & thus it is important to keep the periodontal status under control during treatment (21).

Adults are more vulnerable to root resorption on application of orthodontic force (21). Light continuous force must be employed to minimize the risk of root resorption & the patients must be informed of the potential risk before starting the treatment (2,5,8). Long – distance movement and the torquing of the teeth should be avoided.

It is important to remember that crestal bone loss is common in adults & thereby the biomechanics need to be modified. The center of resistance of teeth shift apically due to the loss of attachment, which in turn leads to increased tipping moment produced by a given force (22). This should be controlled with properly applied mechanics during the course of orthodontic treatment. Bite opening must be achieved by intrusion of incisors rather than extrusion of molars, because there is no growth potential left in adults to compensate for extruded molars (5).

It is important to achieve a satisfactory periodontal & functional environment before finishing the treatment, as it helps to provide a good condition to maintain the oral hygiene further. Teeth might have to be splinted & thus the permanent retention is usually needed to prevent spontaneous migration of teeth. This is mainly due to the fact that due to the marginal bone loss, the centre of resistance of the teeth migrates further apically, resulting in disturbance of equilibrium between the forces & the resistance provided by the teeth & their supporting tissues. (23). Adults exhibit higher relapse tendencies compared to adolescents due to their inability to achieve an early neuro-muscular equilibrium of tissues, & thus requiring permanent retention in most cases (24).

CONCLUSION

The number of adult patients seeking orthodontic treatment has increased in the recent years. These patients are usually concerned about esthetics, but may

have other complications which could pose a treatment challenge to the concerned orthodontist. The limitations of adult orthodontics must be borne in mind & explained to the patient before arriving at the treatment decision. The patient must be evaluated for systemic diseases, perio-restorative problems, TMJ disorders, & vulnerability to root resorption also. The biomechanics must be customized for the individual treatment requirement & multidisciplinary approach should be employed when required in order to maximize the treatment benefit. Periodontally - compromised orthodontic patients can be treated satisfactorily if a combined orthodontic/ periodontal approach is used.

This article demonstrates the value of an interdisciplinary approach involving a strictly supervised oral hygiene program for the treatment & restoration of a periodontally - compromised dentition to achieve correction of the malocclusion, a marked improvement in esthetics & long-lasting functional results.

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