Management of Class II malocclusion with ectopic maxillary canines

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Abstract

Correction of Class II relationship, deep bite and ectopically erupting canines is an orthodontic challenge for the clinician. A 13-year-old male patient presented with Class II malocclusion, ectopically erupting canines, and cross bite with maxillary left lateral incisor. He was treated with a combination of Headgear, Forsus™ fatigue resistant device [FFRD] with fixed mechanotherapy for the management of space deficiency and correction of Class II malocclusions. Headgear was used to distalize upper first molars and also to prevent further downward and forward growth of the maxilla. Then Forsus™ FFRD was used for the advancement of the mandible. The molar and canine relationship were corrected from a Class II to a Class I. The objectives were to establish good occlusion and enable eruption of unerupted canines. All these objectives were achieved and remained stable.

Keywords: Class II malocclusion, ectopic canines, Forsus™ fatigue resistant device, Headgear

Introduction

Class II correction is a major reason for patients to seek orthodontic treatment. Combinations of dental and skeletal factors ranging from mild to severe are multiple characters of this discrepancy. The treatment protocols for Class II can vary widely according to professional ability, time of treatment, severity of malocclusion and patient compliance.

One of the recommended therapeutic approaches to Class II malocclusion in growing patients is Functional Jaw Orthopedics for mandibular advancement. Fixed devices for sagittal advancement of the mandible can be used in association with fixed mechanotherapy and is a recent advancement. The effects of several compliance-free appliances for mandibular anterior repositioning in association with fixed appliances have been investigated.[1-5] An increasingly popular fixed functional appliance is the Forsus device.[6-8] The Forsus (Forsus Fatigue Resistant Device [FFRD]) is a semirigid telescoping system incorporating a superelastic nickel-titanium coil spring that can be assembled chair-side. It is compatible with complete fixed orthodontic appliances and can be incorporated into pre-existing appliances.

Forsus™ FFRD[9] attaches at the maxillary first molar and onto the mandibular archwire, distal to either the canine or first premolar bracket, creating a mesial force on the mandibular arch and a distal force on the maxillary arch. As the coil is compressed, opposing forces are transmitted to the sites of attachment. Thus, the spring exerts equal and opposite forces onto the maxillary molars as well as the mandibular incisors. The intrusive force on maxillary molars can decrease posterior vertical dimension, and the intrusive force on mandibular incisors will bring about their intrusion. This appliance shows a greater range in activation and a less likelihood of breakage when compared to other inter arch compression springs.

Headgear is used in Class II patients to restrict the growth of the maxilla. Teuscher[10] suggested that forward and downward growth of the maxilla could be altered using Headgear, and the mandible could also change its growth direction to a forward and upward position with condylar adaptation.

A combination of Forsus™ FFRD and Headgear can bring about dramatic changes in the management of space deficiency and correction of Class II malocclusions.

This case report describes the management of such a case with desired results.

Diagnosis

A 13-year-old male patient reported to the author's private clinic with a chief complaint of unerupted teeth in the upper front region and sought treatment for the same. Review of the patient's medical and family histories revealed no significant findings. Extra orally patient presented with a symmetrical face, convex profile and competent lips [Figure 1]. Lower midline was shifted to left by 2 mm. Intraoral examination revealed

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Class II molar relation on both sides, deep bite, ectopically erupting and blocked out maxillary canines, upper left lateral incisor was in cross bite and crowding in the mandibular anterior teeth and insufficient space for 33. On radiographic examination, it was observed that the patient also has a deficient and backwardly placed mandible [Figure 2].

Treatment objectives

The following treatment objectives were established:

- To correct the skeletal and dental Class II malocclusion, which would include restriction of maxilla and advancement of mandible
- To correct crowding in both the arches and space management for ectopically erupting canine
- To achieve ideal overjet and overbite
- To improve his facial appearance.

Treatment plan

A nonextraction treatment plan with fixed mechanotherapy was decided. Headgear would be used to restrict the growth and also to distalize the maxilla. This would help to manage space for ectopically erupting canines along with open coil spring. Forsus™ FFRD would be used to advance the mandible for Sagittal correction.

Treatment progress

A fixed orthodontic appliance (MBT 0.022 3 M Unitek) was initially bonded to the maxillary arch and 0.016" NiTi round arch wire was placed in the maxillary arch for the initial leveling and aligning phase [Figure 4]. Headgear therapy was started along with orthodontic strap up to distalize molars and to restrict downward and forward growth of the maxilla [Figure 3].

Space was created for the ectopically erupting maxillary canines using open coil NiTi springs, which were placed between the maxillary lateral incisors and first premolars [Figure 4]. Once sufficient space was created by Headgear and open coil spring, the maxillary canines were bonded and ligated to the arch wire. The ligature was activated periodically till the canines were brought into the maxillary arch. After the canines had been brought into their respective places, the maxillary arch wire was engaged into the canine brackets. The lower arch was bonded 1-month after commencement of treatment and 0.016" round NiTi wire was placed in the mandibular arch.

The 016" round NiTi wires were then followed by the 019" × 025" rectangular NiTi wires. Then 0.019" × 0.025" rectangular stainless steel wires were placed in the upper and the lower arch. After 9 months of commencement of treatment, Forsus™ FFRD was placed [Figure 4]. Patient was recalled at monthly interval to monitor the progress. Reactivation of Forsus FFRD was done by placing split crimp on the push rod. FFRD was removed when Class I molar and Class I canine relationship was achieved.

Figure 1: Pretreatment extraoral and intraoral photographs

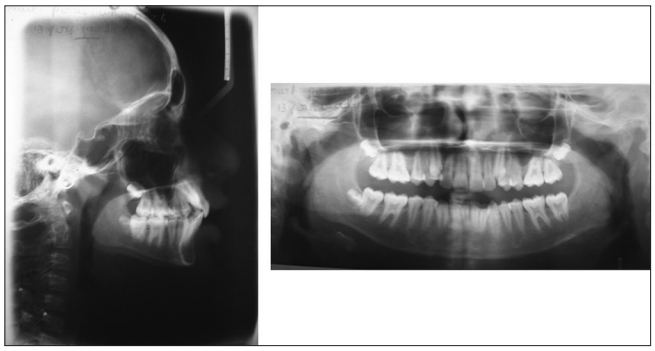

Figure 2: Pretreatment lateral cephalogram and OPG

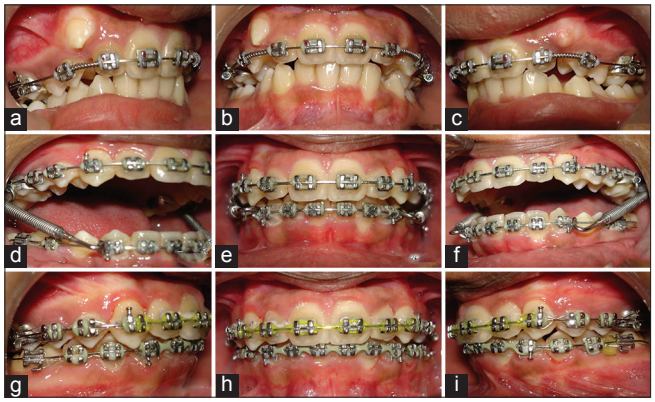

Figure 4: Mid treatment photographs. (a-c) Leveling and aligning with 0.016 SS and creating space for ectopic canines. (d-f) Forsus placement after leveling. (g-i) Finishing and detailing after sagittal correction

Treatment Results

The total treatment time was about 18 months with satisfactory results [Figure 5]. The molar relationship was corrected from a Class II to a Class I. Ideal overjet, and overbite were established [Figure 5]. The deep bite and cross bite were corrected along with the correction of the ectopically erupted maxillary canines. Good intercuspation was achieved. Periodontal evaluation showed acceptable gingival contour and adequate width of keratinized attached gingival tissue around the maxillary canines. The profile was changed from convex to straight profile. Panoramic radiograph shows good root parallelism [Figure 6]. A fixed retainer was bonded in the lower arch and a removable retainer with anterior bite plane was placed in the upper arch. Occlusion remained stable 2 and 3 years after the orthodontic treatment [Figures 7 and 8].

Discussion

Optimal timing for Class II treatment with fixed functional appliance is at the pubertal growth spurt with enhanced mandibular skeletal changes and minimal dentoalveolar compensation.[11] Studies have shown that functional appliances improve the sagittal effect on the mandible by a significant overjet reduction.[12] Functional appliances also showed

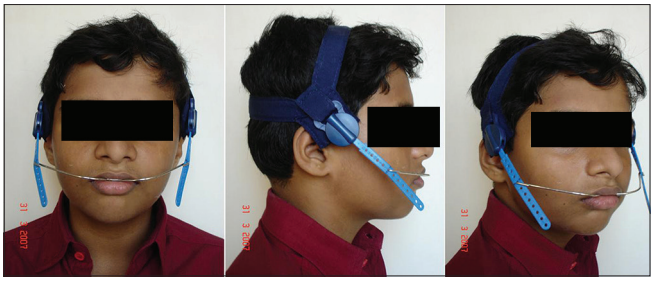

Figure 3: Headgear with fixed mechanotherapy

Figure 5: Post treatment photographs

growth restraining effect on the maxilla.[12-15] Skeletal changes in functional appliances are brought about by stimulation of condylar growth[16,17] as well as remodeling of fossa.[18-20] Besides the sagittal skeletal base improvement influencing overjet, the dentoalveolar effect on overjet is brought about by retroclination of maxillary and proclination of mandibular incisors.[12,14] The use of Headgear not only restricts the sagittal growth of the maxilla but also moves posterior teeth backward. However, combination of extra oral and functional appliances seem to affect the sagittal intermaxillary relationship by acting mainly on the mandibular skeletal base and also having effect on dentitions.

Ruf and Pancherz reported that Herbst and multibracket appliance combination was found to be a powerful tool for nonsurgical nonextraction treatment of Class II div 1 subjects in early and late adulthood.[21] Disarticulation of teeth after the placement of Forsus aided mandibular advancement. The FFRD is relatively well accepted by the patients.[8] As opposed to rigid fixed functional devices, the spring of the FFRD allows flexibility in the position of the mandible. Since it is fixed in the patient's mouth, the clinicians do not have to rely on a patient's cooperation.

In this case, Headgear was given at the beginning of the treatment along with fixed mechanotherapy. Headgear helped in anchorage control and to some extent upper molars were distalized. Space for the alignment of ectopically erupting canines was created partly by open coil spring and partly by molar distalization. Mandible was advanced with Forsus™ FFRD for the correction

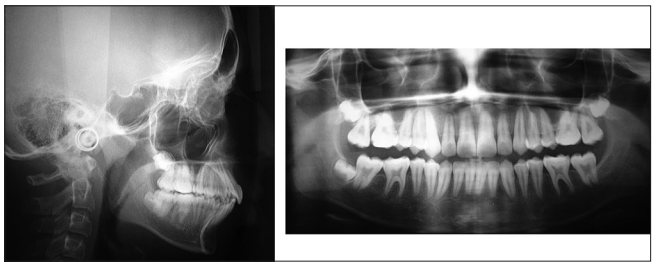

Figure 6: Post treatment lateral cephalogram and OPG

Figure 7: Post retention photographs after 2 years

Figure 8: Post retention photographs after 3 years

of Class II skeletal pattern. Disarticulation of teeth after the placement of Forsus aided mandibular advancement.

Combination appliance in this case helped in (1) restriction on maxillary growth. (2) Distalization of maxillary molars. (3) Correction of ectopically erupting canine (4) Retrusion of maxillary incisors. (5) Extrusion of posteriors. (6) Intrusion of lower anteriors, (7) correction of overjet and overbite. The treatment results showed a balanced facial profile, good interdigitations, improvement in maxillomandibular relationship. The occlusion remained stable even after 3 years.

Conclusions

This case report demonstrates the efficiency of the combined clinical use of Headgear and Forsus with fixed appliance to distalize the maxillary molar and also to advance the mandible.

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