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Utilizing Forsus Fatigue Resistance Device for Harmonious Facial Profile in Class II Malocclusion- A Case Report

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Abstract

Skeletal class II malocclusion is a common orthodontic situation. Forsus is a fixed functional appliance that works really well for the treatment of class II malocclusion. It can apply a steady force, the degree of which can be changed by selecting a pushrod from various sizes to meet varied therapeutic needs. When the Forsus FRD's spring is compressed to 12 mm, a force of 226g can be applied.

A case report of a 13-year-old patient, who was diagnosed in the department of orthodontics and dentofacial orthopaedics, has been described. In this case, patient had a convex facial profile and visual treatment objective was positive. Cephalometric radiograph revealed presence of skeletal class II malocclusion. Intraoral examination showed presence of Angle's class II division 1 malocclusion. Accordingly, the innovative treatment plan was designed for extraction of over retained deciduous teeth, followed by space closure using mushroom loop (M Loop). Treatment plan also included, correction of class II division 1 malocclusion using fixed orthodontic treatment using MBT 0.022" slot prescription with forsus fatigue resistance device(FRD), establishing functional stability and esthetics, without disturbing the surrounding structures and maintaining the periodontium integrity. Case was successfully completed in 1.5 years.

Keywords: Class II malocclusion, Forsus (FRD), Fixed functional appliance, Mushroom loop (M loop)

Introduction

Class II malocclusion is the most common sagittal issue in orthodontics and it affects one-third of the population. Functional jaw orthopaedics using the mechanism of mandibular advancement is one of the suggested therapy options for Class II malocclusion in growing patients.[1]Fixed functional appliances (FFAs) were initially presented by Emil Herbst in 1905 as

correctors for Class II malocclusions in patients who do not comply with treatment. Numerous variations of FFAs have been created, all of which can be classified into three types: rigid FFAs, flexible FFAs, and semi-rigid (hybrid) FFAs. However, the dental modifications observed in the final outcomes of these appliances were found to be more pronounced than the skeletal alterations. The Class II molar relation was corrected as a result of these dental changes, which included the retroclination of incisors and distalizing force to the molars in the maxillary arch and the mesial movement of molars and proclination of the lower incisors in the mandibular arch.[2] The Forsus™ fatigue resistant device (Forsus; 3M Unitek, Monrovia, CA, USA) is one fixed appliance used to treat Class II malocclusion. It is compatible with full fixed orthodontic appliances and is a three-piece (L pin module) or two-piece (EZ module) semirigid telescoping system with a coil spring that can be assembled at the chair side. Forsus is connected to the maxillary first molar and mandibular archwire, distal to either the canine or the first premolar bracket. Opposing forces are transferred to the attachment sites as the coil is compressed.[3]

The impact of the Forsus FRD's biomechanics on the modification of facial aesthetics in individuals with Class II malocclusion is examined. Patients with this kind of malocclusion frequently complain about having a convex facial profile. Patients with Class II malocclusion benefit greatly from improved facial harmony, particularly when it comes to regaining social acceptance and self-confidence.[4] Patient's expectations regarding orthodontic treatment can be predicted by their level of satisfaction with their facial and dental appearance.[5]This case report explains how to correct a Class II malocclusion using a Forsus™ fatigue resistant device.

Case Report

A 13-year-old female patient reported to the department of orthodontics and dentofacial orthopaedics with a chief complaint of forwardly placed teeth in upper front region of jaw.

1. On extraoral examination patient had a convex profile, average nasolabial angle, deep mentolabial sulcus and incompetent lips. (Figure 1)

Figure 1: Pre-treatment extraoral photographs (a) Frontal at rest; (b) smiling; (c) Profile view; (d) Three quarter view

On intraoral examination patient had class II canine relation on right and end-on on left side, class II molar relation on both sides, Class II division 1 incisor relation, overjet of 11mm, overbite of 6.5mm; over retained deciduous irt.53, scissor bite irt. 14 & 44 (Figure 2)

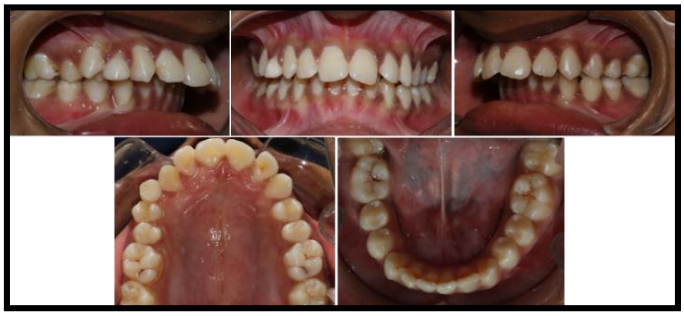


Figure 2: Pre-treatment intraoral photographs (a) Right buccal; (b) Frontal; (c) Left buccal; (d) Maxillary occlusal (e) Mandibular occlusal

1. Pre-treatment records were taken and cephalometric tracing was done. (Figure 3; Table 1)

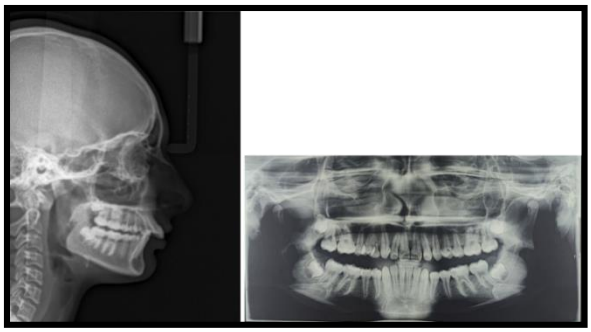


Figure 3: Pre-treatment x-rays (a) Lateral cephalogram (b) OPG

Diagnosis

- **Skeletal**: Class II Skeletal jaw bases, with orthognathic maxilla and retrognathic mandible with respect to cranial base and hypodivergent growth pattern.
- **Dental**: Angle's Class II Division I malocclusion with proclined upper incisors and retroclined lower incisors, overjet of 11 mm and overbite of 6.5mm, curve of spee of 3mm; over retained deciduous irt.53, scissor bite irt. 14 & 44.
- **Soft tissue**: Convex facial profile, average nasolabial angle, deep mentolabial sulcus and incompetent lips.

History

Patient didn't give any relevant medical or dental history. No relevant history of any habit.

Problem list:

Skeletal

- Class II skeletal jaw bases.

Dental

- Over retained deciduous irt.53.
- Scissor bite irt. 14 & 44.
- Proclined maxillary Incisor.
- Retroclined mandibular incisors.
- Mild crowding in lower anteriors.
- Increased overjet.
- Increased overbite.
- Increased curve of spee.

Soft Tissue

- Convex facial profile.
- Deep mentolabial sulcus.

Treatment objectives

- Establishment of skeletal class I relation.
- Establishment of initial levelling and alignment.
- Scissor bite correction 14, 44.
- Correction of upper incisors axial inclination.
- Correction of crowding in lower anteriors.
- Correction of rotations.
- Establishment of proper overjet and overbite.
- Establishment of proper occlusion.
- Establishment of favourable soft tissue profile.

Treatment plan

Fixed orthodontic therapy with pre adjusted edgewise MBT bracket with 0.022" slot.

Upper Arch

- Extraction of retained deciduous irt.53
- Initial alignment and levelling.
- Group A anchorage.
- Complete space closure.

Lower Arch

- Initial alignment and levelling.
- Complete space closure.

Fixed Functional appliance (Forsus appliance)

Treatment progress

Pre-adjusted Edgewise MBT 0.022" slot brackets were bonded in upper and lower arches, and initial alignment was done using round and rectangular Niti and SS archwires. Retained deciduous canine irt.53 was extracted. Mushroom Loop made of 0.019"x 0.025" TMA archwire was placed in the upper arch for space closure in the extraction space (Figure 4).

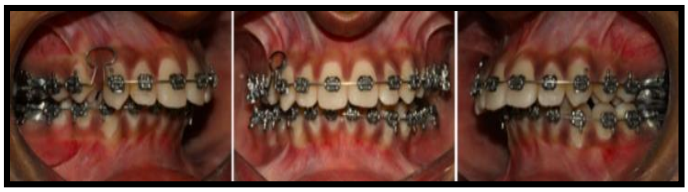


Figure 4: Mushroom Loop in upper arch

Initial levelling and alignment were completed. Pre-forsus records were taken and cephalometric tracings were done. (Figure 5 and 6)

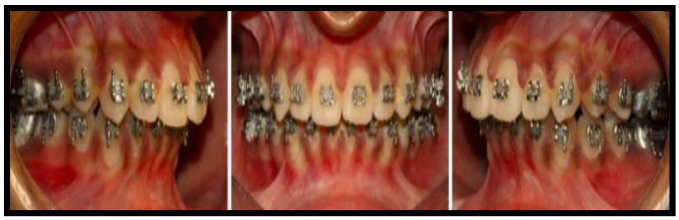


Figure 5: Pre-forsus intraoral photographs (a) Right buccal; (b) Frontal; (c) Left buccal

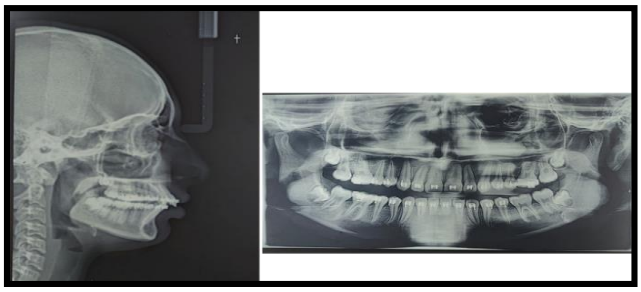


Figure 6: Pre-forsus x-rays (a) Lateral cephalogram (b) OPG

Visual treatment objective (VTO) was positive (Figure 7).

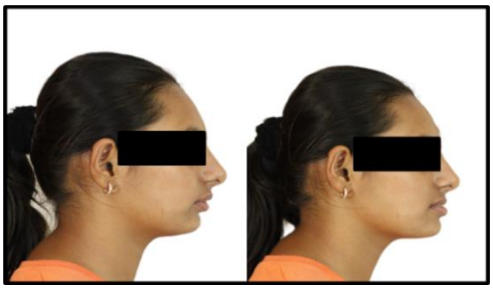


Figure 7: Pre-forsus extraoral photographs (a) Profile view (b) VTO positive

Placement of 0.019"x 0.025" stainless steel archwire along with 3M Unitek Forsus Appliance was done as shown below (Figure8). Full class II correction was achieved, which took 4 months.

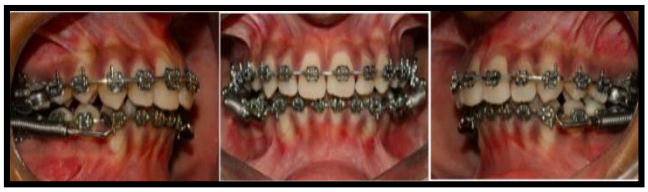


Figure 8: Forsus intraoral photographs (a) Right buccal; (b) Frontal; (c) Left buccal

Class II elastics were given for another 3months after removal of appliance followed by settling elastics (Figure 9).

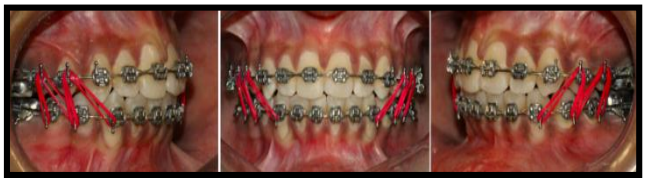


Figure 9: Post-forsus intraoral photographs with settling elastics (a) Right buccal; (b) Frontal; (c) Left buccal

Retention plan

After completion of treatment patient was given fixed lingual retainer in both maxillary and mandibular arches to prevent relapse. To assess the stability of the treatment the patient was recalled after one-year post-retention for follow-up evaluation (Figure 10, 11, 12 and 13)

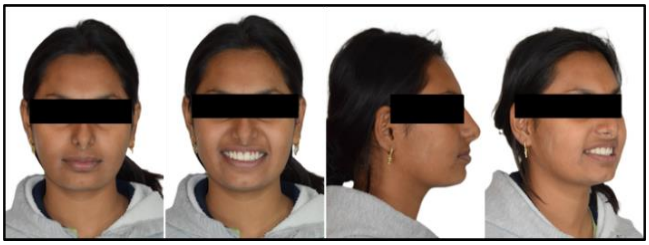
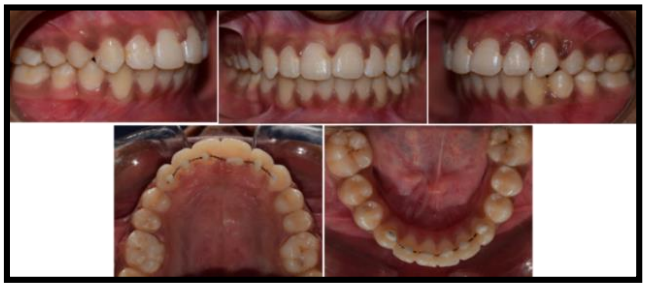


Figure 10: Post-treatment extraoral photographs (a) Frontal at rest; (b) Smiling; (c) Profile view; (d) Three quarter view



Variables	Normal Value	Patient Value (Pretreatment Records)	Patient Value (Post Treatment Records)
SNA	(82 ± 2^0)	82^0	82^0
SNB	(80 ± 2^0)	77^0	79^0
ANB	(2 ± 2^0)	4^0	2^0
Wits Appraisal	(0 to 1mm)	3mm	2mm
Upper Incisor To SN	(102 ± 2^0)	118^0	104^0
Upper Incisor To NA	(22^0, 4mm)	40^0 ,10mm	24^0 ,4mm
Lower Incisor To FH	(65^0)	69^0	56^0
Lower Incisor To Mandibular Plane (MP)	(85^0 - 95^0)	90^0	102^0
Lower incisor to A-Pog line	(22^0, 4mm)	16^0, 1mm	28^0, 5mm
Inter-Incisal Angle	(131^0)	128^0	132^0
FMA	(22^0 - 28^0)	23^0	25^0
Nasolabial Angle	(102 ± 8^0)	107^0	99^0
Mentolabial Sulcus	(122 ± 10^0)	97^0	105^0

Figure 11: Post-treatment intraoral photographs (a) Right buccal; (b) Frontal; (c) Left buccal; (d) Maxillary occlusal (e) Mandibular occlusal

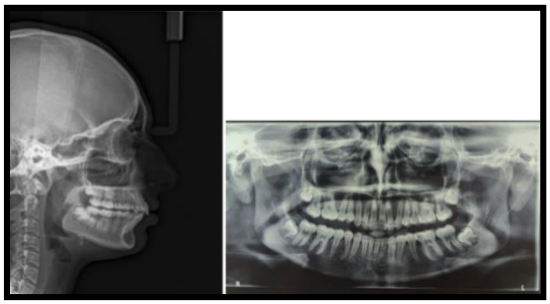


Figure12: Post-treatment x-rays (a) Lateral cephalogram (b) OPG

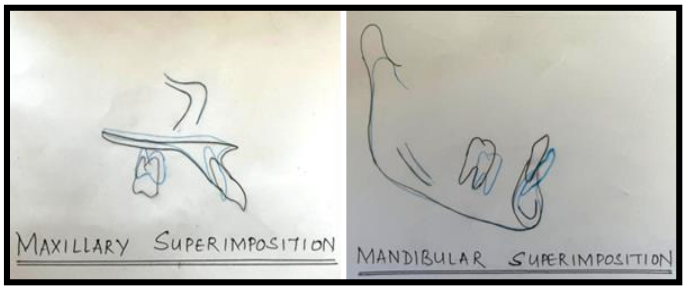


Figure 13: Superimposition (a) Maxillary superimposition (b) Mandibular superimposition

Cephalometric analysis (Table 1)

Treatment result

- Retained deciduous tooth was extracted.
- Upper and lower incisors axial inclination was corrected.
- Proper overjet and overbite established.
- Scissor bite with14,44 was corrected.
- Proper occlusion was established.
- Class I molar relationship and class I canine relationship was achieved successfully.
- Favorable soft tissue profile was established.

Discussion

Numerous therapeutic methods exist for Class II treatment. Orthodontists often select a treatment plan considering patient's compliance and the area of the craniofacial structure they think the appliance will impact the most. Aras et al. discovered that the Forsus appliance has a minimal impact on mandibular growth, which diminishes significantly with age. The Forsus appliance

demonstrated fewer negative impacts on the physiologic disc-condyle relationship in comparison to the Herbst appliance over the long term. They clarified that the variations between the Forsus and Herbst appliances could be linked to the differences in their rigidity[6]. Forsus displayed results comparable to other mandibular advancement devices, producing dentoalveolar changes that supported Class II correction, though with minimal skeletal alterations[7].

Jones (2008) found in a study that FFRD, when compared to class II elastics, results in a notable mesial shift of the lower molar and overall molar correction in the Forsus group. Moreover, Franchi and Bacetti (2011) evaluated the comprehensive impacts of FFRD relative to fixed orthodontic treatment in addressing class II malocclusion. They determined that FFRD exhibited considerable alterations in the maxillomandibular relationships, exerting a restraining influence on the maxilla[8].

When applied in the appropriate situation, the FFRD device can be both cost-effective and comfortable for the patient and the clinician.[9] The device has several drawbacks similar to many of patients encounter pain and chewing difficulties at first, which diminishes gradually. A small number of patients encounter sensitivity, lip tenderness, and irritation of the cheek. At times, it can also result in the formation of ulcers within the oral mucosa[10].

Conclusion

The use of Forsus FRD for mandibular advancement has enabled a predictable outcome**.** This case report also states the successful use of mushroom loop[11] which allowed efficient and precise space closure technique; and achieving functional efficiency structural balance and esthetic harmony.

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