http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v8i3.109

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Class II Correction with Forsus Fixed Functional Appliance in Class II Division 2 Malocclusion: A Case Report

Authors
Dr Irum Uzma Siddiquie[1], Dr Saba Khan[2], Dr Muhammed Shareef Parakkal[3], Dr Mohd Zubair Ansari[4]
[1,2,3,4]Department of Orthodontics and Dentofacial Orthopaedics, Dr Ziauddin Ahmad Dental College/ Aligarh Muslim University, India

Abstract
Case Report of a 14 year old male patient reported with class II division 2 malocclusion with increased overbite, decreased over jet, retroclined upper anteriors, concordant midline, convex facial profile, posterior divergence on skeletal class II base with hypo divergent growth pattern and CVMI stage IV. this case was treated with utility arch and MBT prescription for the duration of 2 year, class II correction is achieved with the help of Forsus fixed functional appliance. The result showed correction of overjet and overbite, with class I molar and canine relation and marked improvement in facial esthetics
Keywords: *Class II Div 2, class II correction, Forsus fixed functional appliance.*

Introduction

Class II malocclusion presents a major and common challenge to orthodontic practice that exhibits maxillary protrusion, mandibular retrognathism or combination of both, with abnormal dental relationship and facial aesthetic disorders. Treatment modalities are chosen based on the consideration of skeletal, dental and soft tissue factors. Functional orthopedic appliances are mostly used to treat Class II malocclusion originated from mandibular retrusion. Non complaint patients and patient who already passed their growth spurt are mostly treated with fixed functional appliances. One of the most preferred compliance free fixed functional appliances is Forsus Fatigue Resistant Device (FRD, 3M Unitek, Monrovia, Calif) which is a three piece telescopic system incorporated with super elastic nickel- titanium coil spring coming under the catogery of Hybrid appliance [1]

Case Report

A 13 year old male reported to the department of orthodontics with complaint of irregularly placed upper and lower front teeth with familial history of class II div 2 malocclusion. He had no history of habit and relavant medical history.

On extraoral examination, the patient had apparently symmetrical mesoprosopic face with convex profile, posterior divergence & competent lips. Smile analysis showed a high smile line with a non-consonant smile arc and morley's ratio of 100% (**Figure 1**). Upon intraoral examination the patient had class II molar and canine relationship bilaterally, an overjet of 1 mm, overbite of 80%, occlusal features showed symmetric U-shaped maxillary arch and an ovoid shaped mandibular arch with mild crowding in lower anterior region. (**Figure 1**) The periodontal tissues were found to be healthy. The functional examination showed

no signs or symptoms of a temporomandibular joint disorder.

Cephalometric findings presented as a forwardly placed maxilla with retrognathic mandible resulting in skeletal class II relation (ANB=5˚, Wits=4.5mm, APP-BPP= 8mm, MM bisector= 3mm). The patient had a hypodivergent growth pattern as showed by FMA 20°, SN-MP 22°, Y Axis 55°, Bjork's sum 383°. Gonial angle 113° along with retroclined upper and normally placed lower incisors (Max 1-APog= 5mm, Max 1-NA=17˚&3mm, Mand 1-APog=0mm, Md I –NB = 4mm &23^0 & IMPA=100˚). Soft tissue cephalometric analysis revealed little protrusive upper and lower lip w.r.t S and E line, nasolabial angle was 100^0 without lip strain (**Figure 2**).

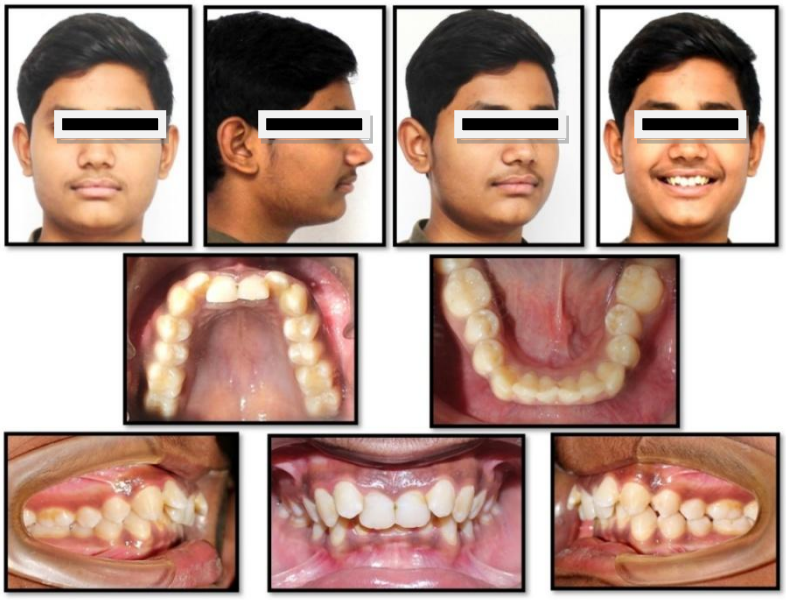

Figure 1: Pre-treatment photographs

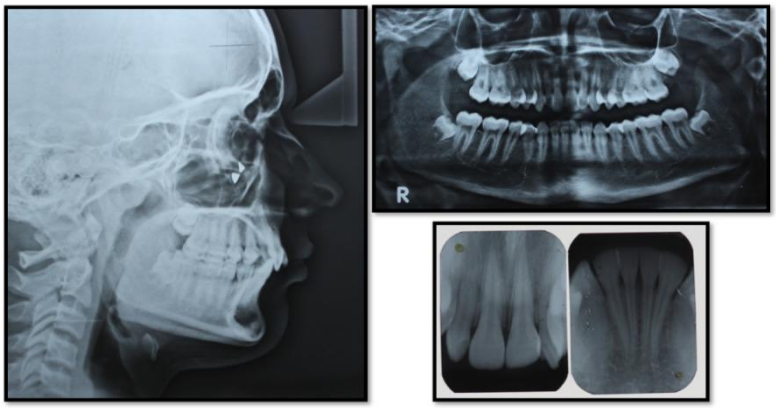

Figure 2: Pre-treatment radiographs

The panoramic X-ray showed the presence of upper and lower third molars in all quadrant with no apparent pathologies (**Figure 2**). Study Model analysis showed a total discrepancy of 2 mm in the upper arch and -1 mm in the mandibular arch.

Diagnosis and Treatment Objectives

An 13 year old male with chief complaint of irregularly placed upper and lower front teeth has Angle's class II molar and canine relation bilaterally with class II Division 2 incisor pattern, decreased overjet, increased overbite on skeletal class II base with hypodivergent growth pattern and CVMI-IV.

The goal was to obtain a good facial balance with optimum static and functional occlusion. The treatmentobjectives were:

- Correction of class II skeletal base
- Correction of retroclined upper incisors

- Correction of deep bite
- Achieving class I molar and canine relation bilaterally.
- correction of overjet and overbite
- Achieving stable occlusal function
- Achieving optimum soft tissue balance
- Long term retention

Treatment Plan

By considering cephalometric hard and soft findings as well as the study model analysis a conservative treatment plan was outlined with non extraction fixed orthodontic mechanotherapy

Treatment Progress

Treatment is started with a 2 X 2 utility arch in maxilla for intrusion and proclination for upper central incisors **(Figure 3)**. 3 months later after proclining incisors both maxillary and mandibular arch were banded and bonded using preadjusted edgewise appliance (MBT 0.022x0.028 slot) and an initial 0.016" NiTi wire was placed for levelling and alignment of the arches. By 5 months, good levelling and alignment was achieved to place 0.019 x 0.025-inch SS wires in both upper and lower arch **(Figure 4)**. 6 mm of overjet and 50% of overbite were remaining after levelling and alignment with class II molar and canine relation. Then a 32 mm Forsus Fixed functional appliance was delivered which fixed in molar tube in maxillary arch and distal to canine on mandibular arch wire for 5 months. With the treatment Marked reduction in overjet and overbite were noticed with significant improvement in the facial profile. Forsus was removed after achieving class I molar and canine relation on both the sides and an acrylic plate with reverse inclined plane was given to avoid relapse. Occlusal settling was done with 0.14 inch stainless steel wire with settling elastics. The total treatment took 18 months to settle a class II div 2 case in class I molar and canine relation with improved facial aesthetics.

Figure 3: Utility arch for intrusion and proclination of retroclined incisors

Figure 4: Levelling and alignment

Figure 5: Forsus FRD Fixed Functional Appliance

Treatment Results

The facial aesthetic was improved with better lip support **(Figure 6)**. The smile was enhanced and the consonant smile arc was achieved. Intraorally, ideal overjet and overbite was achieved with Class I molar and canine relationship **(Figure 7)**. The post treatment panoramic radiograph showed good overall root parallelism and lack of root resorption.Post treatment lateral Cephalogram **(Figure 8)** showed no change in the skeletal parameters SNA, SNB, ANB, Wits remain unchanged after treatment, satisfactory improvement is noted in dentoalveolar parameters. The position of upper and lower incisors were improved, upper incisor at 27° and 5mm to NA and the lower incisor at 32° and 4mm to NB with an IMPA of 111°. A favorable change in facial profile angle was seen. A functionally stable and esthetic occlusion was achieved during a period of 16 months. **(Table 3 and 4)**

Figure 6: Post-treatment extraoral photographs

Figure 7: Post treatment Intraoral photographs

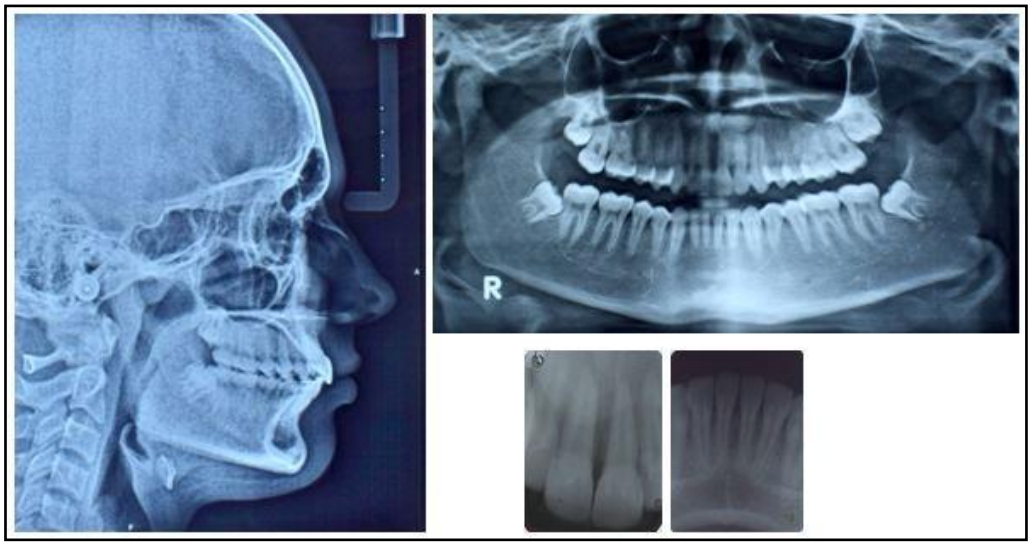

Figure 8: Post treatment radiographs

Cephalometric parameters	Pre treatment	Post treatment
SNA	82^0	81^0
SNB	77^0	78^0
ANB	5^0	3^0
WITS	4.5 mm	3 mm
N⊥A point	0 mm	-2 mm
N⊥ B point	-15 mm	-12 mm
N⊥ Pogonion	-13 mm	-10mm
FMA	20^0	23^0
SN-MP	22^0	28^0
Bjork	383^0	390^0
Mx I to NA	3mm	5 mm
Mx I to NA	17^0	27^0
Md I to NB	0 mm	4 mm
Md I to NB	23^0	32^0
IMPA	100^0	110^0
E – line upper lip	-2mm	-3mm
E – line lower lip	0mm	2mm
Nasolabial angle	100^0	96^0

SO (Sagital occlusal) Analysis (Pancherz)

Variables Linear Measurements	Pre treatment	Post treatment
Maxillary Base (ss/RLp)	79 mm	78.5mm
Mandibular Base (pg/RLp)	74 mm	76 mm
Maxillary incisor (is/RLp)	84 mm	83 mm
Mandibular incisor (ii/RLp)	78 mm	82mm
Maxillary Molar (ms/RLp)	56 mm	54.5 mm
Mandibular molar (mi/RLp)	53 mm	57mm
Overjet	6 mm	1 mm
Molar relation	+3 mm	-2.5 mm

Retention

Bonded lingual retainer for lower arch and removable Hawleys retainer with reverse inclined plane for the upper arch were given for retention.

Discussion

A functional appliance is an appliance that is designed to alter the neuromuscular environment of the orofacial region to improve occlusal development and craniofacial skeletal growth.

Fixed functional appliances are reduces the need for patient compliance and brings the outcome of the treatment in the hands of orthodontist. Though the class II correction achieved in this patient was due to changes in both skeletal and dentoalveolar parameters, changes in dentoalveolar structures were pronounced which include mesial movement of the mandibular molars, distal movement and intrusion of maxillary molar and proclination and intrusion of lower incisors etc. Changes were noticed both in anteroposterior and vertical plane because of the attachment of Forsus that provides a force vector on maxillary dentition in a backward and upward direction and on lower anteriors in a forward and downward direction. Proclination of the lower incisors and retroclination of upper incisor were the significant contributing factor for overjet reduction. The similar result was noticed by Esen Ali Gunay (2011)[2] & Aslan (2014)[3] in their study with Forsus in which class II correction was achieved by dentoalveolar changes without any skeletal changes. Though the patient was in post pubertal growth spurt, he had shown mild skeletal changes both in the anteroposterior and vertical plane which was due to headgear effect of Forsus appliance with restraining effect on maxilla and sagittal advancement in mandibule. Cacciator (2014)[4] had seen improvement in the SNB angle and mandibular growth during circumpubertal age by the use of Forsus FRD. Vertical skeletal changes seen during the treatment were opening of gonial angle, increaded FMA and increase in anterior facial height. Graham Jones (2008)[5] studied the effect of class II elastic and Forsus FRD and concluded that Class II elastics are also effective in correcting Class II malocclusions, and their effects are primarily dentoalveolar. They are similar to the effects of fixed functional appliances in the long term, Forsus is more effective for correcting Class II malocclusion in a shorter treatment period with minimal patient compliance required.

Conclusion

The hybrid fixed functional appliance such as Forsus FRD is a successful treatment protocol for correction of class II malocclusion. The changes brought by the appliance was mainly dentoalveolar with minimal skeletal effect and providing a shorter treatment period and requiring minimal patient compliance. More skeletal changes can be expected in those patients treated in their active growth period like in peak height velocity.

References

1. Franchi, L., Alvetro, L., Giuntini.V., Masucci, C., Defraia,E., Baccetti,T. Effectiveness of comprehensive fixed appliance treatment used with the Forsus Fatigue Resistant Device in Class II patients. Angle Orthodontist,2011, Vol 81, No 4
2. Gunay, EA., Arun,T., Nalbantgil, D. Evaluation of the Immediate Dentofacial Changes in Late Adolescent Patients Treated with the Forsus FRD. Eur J Orthod 2011;5;423-432
3. Aslan,B., Kucukkaraca, E., Turkoz, C., Dincer, M. Treatment effects of the Forsus Fatigue Resistant Device used with miniscrew anchorage. Angle Orthod 2014; 84(1;,76-86
4. Cacciatore G, Ghislanzoni HT, Alvetro L, Franchi L. Treatment and post treatment effects induced by the Forsus appliance a controlled clinical study. Angle Orthod 2014; 84:1010-17
5. Jones G et al, Class II Non-Extraction Patients Treated with the Forsus Fatigue Resistant Device Versus Intermaxillary Elastics. Angle Orthodontist, Vol 78, No 2, 2008
6. Mahamad IK, Neela PK, Husain MR. A comparison of Twin Block and Forsus appliance a cephalometric study. Int J Orthod Milwaukee 2012; 23(3):49-58.

7. Oztoprak MO, Nalbantgil D, Uyanar A, Arun T. A cephalometric comparative study of class II correction with Sabbagh Universal Spring and forsus FRD appliance. Eur J Dent 2012;6 :302-10
8. Bowman AC, Saltaji H, Mir FC, Preston B, Tabbaa S. Patients experience with the Forsus Fatigue Resistant Device. Angle Orthod 2013;83:437-46.
9. Perineti G, Primozic J, Furlani G, Franchi L, Contrado L. Treatment effects of Fixed Functional Appliance alone or in combination with multi bracket appliance. Angle Orthod 2015; 85:480-92.
10. Servello DF, Fallis DW, Alvetro L. Analysis of Class II patients, successfully treated with the straight-wire and Forsus appliances, based on cervical vertebral maturation status. Angle Orthod 2015;85:80–86.