

Management of Adolescent Skeletal Class II with Fixed Functional Appliance (FFRD): A Case Report

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ABSTRACT

Background: Skeletal class II malocclusion is considered as one of the most commonly occurring malocclusion. In young patients growth modification serves as a best option to treat such cases. This is a case report of 13 year old one year post pubertal female patient who presented with severe skeletal class II malocclusion with retrognathic mandible and recessive chin and with severe crowding in upper and lower anterior region. The patient was successfully treated with Forsus™ FRD device which improved the patient facial profile and self-confidence.

Keywords: Class II malocclusion, Forsus Fatigue Resistant Device, Growth modulation.

INTRODUCTION

Class II malocclusion presents a major concern and common challenge for orthodontists to treat.¹ Numerous orthodontic techniques and appliances have been introduced to treat these malocclusions, including intra-arch and interarch appliances, extra-oral appliances, selective extraction patterns, and surgical repositioning of the jaws.² One of the most recommended therapeutic approaches to treat Class II malocclusion in growing patients is functional jaw orthopedics and the primary mechanism of this appliance is mandibular advancement.³ The major limitations of removable functional appliances is the need for patient collaboration and the lack of the possibility of combining the use of the functional appliance with multibracket therapy in order to shorten treatment duration.⁴ A number of compliance-free interarch appliances have been developed so far and this fixed interarch appliances typically demonstrate mesial movement of the

mandibular molars, tipping of the mandibular incisors, and variable effects which are associated with mandibular growth.^{5,6} Among them an increasingly popular fixed functional appliance is the Forsus device. Forsus also known as the (Forsus Fatigue Resistant Device [FFRD]) is a semi rigid telescoping system incorporating a superelastic nickel-titanium coil spring that can be assembled chair-side, and it can be used in conjunction with complete fixed orthodontic appliances. The FRD attaches at the maxillary first molar and on to the mandibular archwire, distal to either the canine or first premolar bracket.^{7,8}

This present case report demonstrates the management of growing skeletal class II malocclusion with severe crowding in upper and lower arches, which was treated by extraction therapy and use of Forsus Fatigue Resistant Device.

Diagnosis and etiology

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Fig 1: Pretreatment photographs and radiographs.



Fig 2: Pre functional extra oral and intra oral photographs.



Fig 3: Placement of Forsus appliance (29mm 3M Unitek).

A 13 year old female patient reported to the Department of Orthodontics and Dentofacial Orthopedics with a chief complaint of irregularly placed upper and lower front teeth and backward placement of chin. Extraoral examination of the patient shows mesocephalic head pattern and mesoprosopic facial form. Profile was convex with recessive chin. Intraoral examination of the patient revealed severe crowding in upper and lower anteriors with class I molar and canine relation on left side and end on molar and canine relation on right side having an overjet of 4 mm (Figure 1).

Cephalometric examination revealed severe skeletal Class II jaw bases with retrognathic mandible (SNB 76°, ANB 7°, N-B -8mm), and hyperdivergence (FMA 30°). The patient was diagnosed as Class II division 1 malocclusion on severe skeletal Class II jaw bases with hyperdivergence growth pattern.



Fig 4: Post treatment photographs and radiographs.

Treatment alternatives

Treatment objectives were to achieve class I skeletal, dental and soft tissue relationship with an ideal overjet and overbite. Based on the objectives one of the treatment options would be extraction of all first premolars only reducing the upper and lower anterior crowding however this option does not improve the patient profile which is patient's chief concern. Another treatment option is extraction of all first premolars and ending into bilateral end on molar and canine relationship with an overjet of 6mm followed by placement of Forsus™ FRD which is used to advance the mandible for sagittal correction. Because the patient is chiefly concerned about the backward placement of chin we choose the second option.

Treatment progress

Preadjusted edgewise appliance (0.022" X 0.028" slot MBT appliance) was used in the patient. Upper and lower banding and bonding was done. Decrowding, alignment and leveling was carried out by using coaxial and Niti wires for a period of 12 months. In pre-functional stage, the 0.019x0.025" SS wires were placed in both maxillary and mandibular arches where the molars and canines were in end-on relationship bilaterally with overjet of 6mm

Table 1: Comparison of Pre and Post treatment cephalometric values.

Hard tissue parameters	Normal	Pre – R x	Pre Functional	Post – R x
SNA	82°	83°	83°	82°
SNB	80°	76°	76°	80°
ANB	2°	7°	7°	2°
N-A	2mm	3mm	3mm	2mm
N-B	-2mm	-8mm	-8mm	-4mm
AO to BO	0-1mm	4mm	4mm	2mm
NA-Pog	0-5°	10°	7°	5°
FMA	25°	30°	30°	32°
Go-Gn-SN	32°	29°	30°	32°
Y-axis FH-S-Gn	59°	64°	65°	66°
Jarabak's ratio	62-65%	67.3%	67.3%	67%
Angle of inclination	85°	91°	91°	91°
U1 – SN	102°	102°	101°	100°
U1 – NA °/mm	22°,4mm	21°,6mm	20°,5mm	20°,5mm
L1 – MP(IMPA)	90°	98°	96°	95°
L1 – FH(FMIA)	65°	52°	53°	54°
L1 – NB °/mm	25°,4mm	32°,6mm	29°,5mm	28°,5mm
U1 – L1	131°	123°	126°	129°
Nasolabial angle	102± 8°	114°	107°	102°
Mentolabial angle	122±10.7 °	108°	108°	120°

(Figure 2). The mandible was advanced by 5mm using Forsus appliance (29 mm) in 6 months duration (Figure 3). Settling red elastics were given to finish the final occlusion. After treatment the patient has a significant improvement in the facial profile. The Class I molar and canine relation were achieved bilaterally with ideal overjet and overbite of 2mm and matching upper and lower midlines. Upper and lower fixed retainers were given (Figure 4).

DISCUSSION

Class II correction is one of the major reason for the patients to seek orthodontic treatment. The treatment protocols for Class II can vary widely according to professional ability, timing of treatment, severity of malocclusion and patient compliance. One of the recommended therapeutic approaches to correct 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 it is

considered as a recent advancement. Studies have shown that fixed functional appliances improves the sagittal effect on the mandible by a significant overjet reduction⁹. Skeletal changes in fixed functional appliances are brought about by stimulation of condylar growth as well as remodeling of fossa¹⁰ and significant restriction of maxillary growth.¹¹

Studies conducted by Ruf and Pancherz¹² 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 pubertal and postpubertal stages. In the present case report 1 year post pubertal girl has presented to us with a severe crowding in upper and lower anterior region and receding chin with 4mm of Overjet, so it was decided to carry out extraction in order to relieve the crowding and to create a positive amount of overjet followed by placement of Forsus™ FRD for 5 months which results in disarticulation of teeth after the placement of Forsus aided in mandibular advancement.¹³ As compared to rigid fixed

functional devices, the spring of the FFRD allows flexibility in the position of the mandible and it is well accepted by the patient and as it is fixed in the patient's mouth, the clinicians do not have to rely on a patient's cooperation.¹⁴ Forsus placement has resulted in obtaining a class I skeletal, dental and soft tissue relationship and the studies conducted by Franchi L¹⁵ has showed that FRD protocol is effective in correcting class II malocclusion with a combination of skeletal (mainly maxillary) and dentoalveolar (mainly mandibular) modifications. Pretreatment and post-treatment lateral cephalograms values showed a dramatic skeletal and dental improvement (Table 1). The total duration of active treatment was 18 months. Fixed upper and lower retainers were placed.

CONCLUSION

This case report demonstrates the efficiency of Forsus™ FRD device in correcting a skeletal Class II malocclusion. Forsus has resulted in achieving a Class I skeletal, dental and soft tissue relationship by combined skeletal and dentoalveolar effects which has improved the patient self-esteem.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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