



Non extraction treatment of Skeletal Class II non complaint patient with Forsus Fatigue Resistant Device

Mahasweta Dasgupta¹

Corresponding author:-Consultant Orthodontist, West Bengal

Date of Submission: 05-11-2020

Date of Acceptance: 17-11-2020

ABSTRACT: Class II malocclusion with mandibular retrusion can be challenging if the patient reports at the end of growth curve or if non complaint with wear of headgear, functional appliances or both. In such cases, hybrid fixed appliance like Forsus Fatigue Resistant Device which provide both strength and flexibility can be used to achieve excellent results.

This case report describes the use of Forsus Fatigue Resistant Device and non extraction modality to correct class II malocclusion in a 14 year old boy with mandibular retrusion. Significant improvement in facial profile was seen with the use of the appliance with multibonded edgewise therapy.

I. INTRODUCTION:-

The Class II malocclusion is a common prevalent malocclusion reported to Orthodontic clinic, of that mandibular retrusion accounts for majority of cases.¹

The main therapeutic approach involved includes restraining the maxillary dentoalveolar and skeletal protrusion using a headgear and forward repositioning of the mandible using functional appliances or a combination of functional appliance with headgear.

Successful treatment with these modalities of treatment relies heavily on patient compliance. Class II elastics pose the same problem plus have additional vertical effect.

To overcome these problems, fixed functional appliance was first introduced by Emil Herbst known as the Herbst appliance². Fixed appliance have the advantage of being less bulky and can be used with multibracket appliance therapy.

Their greatest advantage seems to be for those patients who report for orthodontic treatment at end of the facial growth. Fixed functional appliances being 24-hour wear appliances produce rapid sagittal correction hence utilising short span of remaining growth to maximum advantage. This seems to be the most

appropriate indication of these appliances besides noncompliant patient

Fixed functional appliance can be either rigid, flexible and hybrid type. Hybrid fixed functional appliances are a combination of optimum strength and flexibility.

Forsus Fatigue Resistant Device-Design and Working.

Forsus Fatigue Resistant Device was developed by William Vogt in 2001³

1. Forsus Fatigue Resistant Device is a three-piece (L pin module) or a two piece (EZ2 module) system, comprising of a telescoping spring that attaches at the upper first molar and a push rod linked to the lower archwire, distal to either canine or first premolar bracket.

2. It is supplied as pre-fabricated ready to ligate kit of five different lengths of 25 mm, 29 mm, 32 mm, 35 mm and 38 mm.

3. The appropriate length is selected by asking the patient to bring his/her mandible forward in class I molar relation and measuring the size from the distal of the maxillary molar tube to the distal of the canine bracket with a disposable ruler provided with the kit.⁴

4. The appliance is usually inserted after the upper and lower arches have been aligned for minor crowding and a rigid steel wire is in situ.

II. CASE REPORT:-

A 14 year old boy reported to the Orthodontic clinic with chief complaint of forwardly placed upper teeth. On intraoral examination, he had a positive overjet of 8mm, upright upper and lower incisors. First molar missing due to extraction done 5 years ago due to caries.

Extraoral examination reveals, convex profile with retruded chin and average growth pattern.

Radiographs and study models were obtained to determine the underlying cause. Cephalometric analysis reveals a Skeletal Class II pattern with retrognathic mandible. Since he was nearing the growth completion, it was

decided to start biphasic approach, fixed appliance therapy followed by fixed functional appliance.



Figure 1:-Extraoral photographs pre-treatment



Figure 2:-Intraoral photographs pre-treatment



Figure 3-Orthopantomogram pre-treatment-All teeth except third molar erupted, first molar missing due to extraction



Figure 4:-Lateral Cephalogram pre-treatment showing mandibular retrusion.



Figure 5:-Fishman skeletal maturity showing appearance of adductor sesamoid-SMI4

vVaVVariable	Pre treatment	Normal values	Inference
SNA	82°	82±2	Skeletal Class II malocclusion
SNB	75°	80±2	
ANB	7°	2±2	
WIT's	5mm	0mm	
A-B plane angle	-9°	-4.6° (-9 to 0)	
Angle of convexity	10mm	-8.5 to 10mm	

Variable	Pre treatment	Normal values	Inference
Vertical skeletal			
SN-Mandibular plane	32°	32°	Horizontal growth pattern
FH-Mandibular plane	26°	21.9° (17 to 28)	
FMA	26°	25° (16-35)	
Facial Axis	3	0±3.5°	
Y -Axis	60°	59.4°	
Jaraback ratio	63.3%	62-65%	
SN-Occlusal plane	12°	14.5°	

Variable	Pre-treatment	Normal values	Inference
Upper incisors to NA	23°/5mm	22°/4mm	Upright upper and lower incisor
Lower incisors to NB	20°/4mm	25°/4mm	
Interincisal angle	103°	130°	Acute nasolabial angle
Nasolabial angle	90°	102±8	Protuberant upper and lower lip
Upper lip to E-line	2mm	-4mm	
Lower lip to E-line	2mm	-2mm	

Treatment objectives

1. Reduce lip protrusion and profile convexity
2. To improve soft tissue esthetics
3. To achieve Class I molar relationship,
4. To achieve class I canine relationship.
5. To achieve ideal overjet and overbite.
6. To achieve long term stability

Treatment plan

1. Leveling and alignment of upper and lower arches
2. Closure of space and mesialisation of second molar to close first molar extraction space.
3. Correction of skeletal discrepancy through Fixed functional appliance (Forsus Fatigue)
4. Finishing and detailing of occlusion.

III. TREATMENT PROCEDURE:-

Bonding is done in the upper and lower arch with 0.022 MBT versatile. Leveling and alignment of teeth in the upper and lower dental arch by means of fixed appliance with 0.014, 0.016, 0.018, 0.017x0.025 Niti archwire sequence. Closure of spaces and mesialisation of second molar initiated to close the first molar extraction space.

After alignment, at 19 x 25” stainless steel wire planning for placement of forsus was done. The distance between distal to buccal tube of 1st molar and distal to canine bracket in both the quadrants of maxillary arch was measured and forsus of 29mm was placed with cinched 19 x 25” stainless steel wire in both the arches.



As functional appliances have a tendency to procline lower anteriors, so Figure of 8 was also done along with cinch back in both the arches.¹⁰ Forsus was placed for 5 months with regular activation after which Class I molar and canine relation was achieved and it was removed. After removal of forsus, 19 x 25” stainless steel wire with labial root torque was placed for a period of 2 months in the lower arch for correction of proclination that occurred due to the effect of forsus. Finally after all the corrections, finishing and detailing phase was carried out using flexible round wire and settling elastics.

A panoramic radiograph was taken to evaluate the roots and their angulation and after getting satisfactory results the patient was debonded after a period of 20months.

A Hawley retainer was given with reverse inclined plane in the retention phase.



Figure 6:-Forsus fatigue appliance in place

3.1-Table showing composite cephalometric values-Comparison of Pre-treatment and Current progress values-Showing improvement in skeletal malocclusion

variables	Pretreatment	Posttreatment	Inference
SNA	82 ⁰	82 ⁰	Skeletal Class I Occlusion
SNB	76 ⁰	80 ⁰	
ANB	6 ⁰	2 ⁰	
WIT's	5mm	1.5mm	
A-B plane angle	-9 ⁰	-2 ⁰	
Angle of convexity	10mm	2mm	
Vertical skeletal parameters			
SN-Mandibular plane	32 ⁰	33 ⁰	Average growth pattern
FH-Mandibular plane	26 ⁰	28 ⁰	
FMA	26 ⁰	28 ⁰	
Facial Axis	-3	0 ⁰	
Y -Axis	60 ⁰	62 ⁰	
Jaraback ratio	63.6%	62%	
SN-Occlusal plane	16 ⁰	20 ⁰	
Dental and soft tissue parameters			
Upper incisors to NA	23 ⁰ /4mm	25 ⁰ /5mm	Proclination reduced Soft tissue profile improved.
Lower incisors to NB	20 ⁰ /4mm	25 ⁰ /5mm	
Interincisal angle	103 ⁰	130 ⁰	
Nasolabial angle	90 ⁰	102 ⁰	
Upper lip to E-line	2mm	0mm	
Lower lip to E-line	2srxrgwmm	-2mm	

IV. RESULTS:-

Comparing the pre and post values, it can be seen that nearly all skeletal and dental objectives has been fulfilled. The overjet has been reduced; the sagittal discrepancy is improved significantly. The mandible has moved forward, SNB angle has increased from 75⁰ to 80⁰, ANB

from 7 to 2 and Wit's appraisal from 5mm to 1.5mm.

Soft tissue values show improvement in nasolabial angle and lip protrusion has reduced.



Figure 7: Posttreatment Extraoral photographs



Figure 8-Posttreatment introral photographs



Figure 9:-Posttreatment Orthopantomogram



Figure 10:-Posttreatment Lateral Cephalogram

V. DISCUSSION:-

In a patient whose growth is nearing completion, and also in non-complaint patients, fixed functional appliance provides an excellent means of correcting mandibular retrusion. A common feature of these patients is normally positioned maxillary and mandibular incisors with positive VTO, convex profile and unaesthetic appearance.

Forsus Fatigue has been extensively studied with its dento-skeletal effect.⁵⁻⁸ Forsus used in a patient in growing or puberty stage may affect mandibular growth, however in later stage it only causes dentoalveolar change by mesializing



mandibular arch and proclining mandibular anteriors.⁹

Since in our case the patient was in pubertal stage, SNB angle has increased indicating skeletal effect has occurred.

The disadvantage of using these appliances are proclining of mandibular incisors. Although, tight ligation, cinch back, anterior crown torque were applied to secure mandibular arch anchorage,¹⁰ still some amount of incisor proclination occurred similar to other studies.¹¹

Use of miniscrew anchorage may help to eliminate this effect.¹²

Another disadvantage is increase in lower anterior facial height which makes it suitable for horizontal to average growers.

VI. CONCLUSION:-

Forsus Fatigue is an effective for treating class II malocclusion in horizontal or average growers, showing best results and skeletal change if used within puberty utilizing the existing remaining growth. Proper case selection and biomechanics may help to achieve excellent results.

REFERENCES:-

- [1]. McNamara JA. Components of Class II malocclusion in children 8–10 years of age. *Angle Orthod.* 1981;51:177-202
- [2]. Pancherz H. Treatment of class II malocclusions by jumping the bite with the Herbst appliance. A cephalometric investigation. *Am J Orthod.* 1979;76:423-42.
- [3]. Vogt W. The Forsus Fatigue Resistant Device. *J Clin Orthod.* 2006; 40:368-377.
- [4]. Kharbanda OP. Diagnosis and Management of malocclusion and Dentofacial deformities. 2nd edition.
- [5]. Franchi L, Alvetto 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 Orthod.* 2011;81:678-83.
- [6]. Giuntini V, VANGELISTI, Masucci C, Defraia E, McNamara, Franchi L. Treatment effects produced by the Twin-block appliance vs the Forsus Fatigue Resistant Device in growing Class II patients. *Angle Orthod.* 2015;85(5):784-9.
- [7]. Jones G, Buschang PH, Kim KB, Oliver DR. Class II nonextraction patients treated with the Forsus Fatigue Resistant Device versus intermaxillary elastics. *Angle Orthod* 2008;78:332-8.
- [8]. Sood S, Kharbanda OP, Duggal R, Sood M, Gulati S. Muscle Response during Treatment of Class II Division 1 Malocclusion with Forsus Fatigue Resistant Device. *Clin Pediatr Dent.* 2011;35(3):331-8.
- [9]. M. Upadhyay, S. Yadav, K. Nagaraj, F. Uribe, and R. Nanda, "Mini-implants vs fixed functional appliances for treatment of young adult Class II female patients: a prospective clinical trial," *The Angle Orthodontist*, vol. 82, no. 2, pp. 294–303, 2012.
- [10]. Ruofang Zhang, Yuxing Bai, Song Lic Use of Forsus fatigue-resistant device in a patient with Class I malocclusion and mandibular incisor agenesis *Am J Orthod Dentofacial Orthop* 2014;145:817-27.
- [11]. Atik E, Kocadereli I. Treatment of Class II Division 2 malocclusion using the forsus fatigue resistance device and 5-year follow-up. *Case reports in dentistry.* 2016;2016.
- [12]. Aslan, E. Kucukkaraca, C. Turkoz, and M. Dincer, "Treatment effects of the Forsus Fatigue Resistant Device used with miniscrew anchorage," *The Angle Orthodontist*, vol. 84, no. 1, pp. 76–87, 2014.