

TREATMENT OF CLASS II DIV I MALOCCLUSION IN YOUNG ADULT WITH FIXED FUNCTIONAL APPLIANCE, AN EFFECTIVE SOLUTION TO NONCOMPLIANT PATIENT: A CASE REPORT

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ABSTRACT

Class II malocclusion is most common problem around the world affecting 1/3 rd of the patients reported for orthodontic treatment management. Mandibular retrusion is the most prevailing characteristic of Class II malocclusion. In adolescent patient treatment by growth modification is one of the most debated topic and noncompliance is the major concern for orthodontists. This paper discusses the management of 21 year old female patients with Angles Class II Division 1 malocclusion with minimal growth remaining and with mandibular retrognathism who were treated with a two-phase therapy. In first phase alignment of arches with fixed Pre Adjusted Appliance (0.022" MBT) was done followed by a second phase involving application of Forsus fixed functional appliance for 6 months that gives continuous sagittal force. Patient compliance is better because of its small size and better adaptation to other functions like mastication, swallowing and speech. Treatment time is short. The growth modulation minimizes necessity of extraction of permanent teeth and probably orthognathic surgery.

KEY WORDS

Class II div 1, Mandibular retrognathism, Fixed functional appliance, forward Mandibular position

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INTRODUCTION

Class II malocclusion comprises a group of specific skeletal and dental features exhibiting mandibular retrusion, distal positioning of lower dental arch and chin, protrusive mid face and proclination of the maxillary incisors. It is one of the most frequently encountered and treated problem in orthodontics, as it affects one third of patients seeking orthodontic treatment.¹ According to McNamara, the most common characteristic of Class II malocclusion is mandibular retrusion, rather than maxillary prognathism². Successful treatment with removable appliance relies heavily on patient compliance and available growth potential³. So, as alternative treatment strategies of functional appliance, 'Fixed Functional Appliance' have been devised where patient compliance is minimum⁴. Functional appliance has a significant role in management of class II cases as it acts 24 hours each day, less patient co-operation needed & treatment time is short. The growth modulation minimizes necessity of extraction of permanent teeth and probably orthognathic surgery⁵. Fixed functional appliances can be grouped into rigid, flexible devices and hybrid type. The most commonly used rigid fixed functional appliances are the Herbst and MARA. Most popular flexible devices are the Jasper Jumper, Klapler super spring, and adjustable bite corrector⁶. The Forsus Fatigue Resistance Device (FRD) is a hybrid type which is relatively flexible yet rigid enough to sustain the forward Mandibular position. The FRD is a three-piece (L pin module) or two-piece (EZ2 module) system, composed of a telescoping spring that attaches at the upper first molar and a push rod linked to the lower archwire, distal to either the canine or first premolar bracket. The FRD spring and rod create an equal and opposite force to the maxillary and the mandibular dentition. The Forsus Fatigue Resistant Device (FRD) is an alternative inter-arch appliance for treating Class II malocclusion. Forces are unloaded when the patient's jaw opens, resulting in intrusive rather than extrusive force vectors. In contrast, Class II elastics load upon jaw opening, producing extrusive forces at their terminal ends and potentially undesirable side effects as the occlusal plane is rotated clockwise. The Forsus FRD exerts a continuous force with more elasticity and flexibility than the

Herbst, permitting a greater range of mandibular opening and lateral movements during speech, chewing, and swallowing. Because muscular forces are distributed over a larger periodontal area, there is less inhibition of the jaw elevator muscles by the periodontal mechanoreceptors, allowing better stabilization of the mandible⁷.

CASE REPORT

A 21-year-old female patient came to Department of Orthodontics and Dentofacial Orthopedics, Dr. R. Ahmed Dental College & Hospital complaining of forwardly placed upper front teeth. On Extraoral Clinical examination she revealed a mesoprosopic facial form with convex profile



Fig - 1

Cephalometric values	pre
SNA	81°
SNB	75°
ANB	6°
FMA	21°
WITS APPRAISAL	+4.5mm
Na perp- Pt A	2mm
Na perp- pog	-3.5mm
UI-NA	6mm/35°
UI-SN	116°
LI-NB	3mm/ 22°
IMPA	92°



Fig - 2 Extraoral and Intraoral photographs before treatment



Fig – 3 Pretreatment cephalograph

which is apparently symmetrical with potentially competent lips having 4 mm of interlabial distance. Hyperactive mentalis activity is present. Intraorally she poses a Class II div 1 malocclusion, with 7.5mm overjet and 6 mm of overbite (Fig. 2). Maxillary Arch is U shaped arch, symmetrical with average palatal vault and having Mid-line diastema. There is disto-palatal rotation of 12 and 15. Mandibular Arch is also U shaped, symmetrical with mild crowding in anterior region (Fig-2). Cephalometrically she exhibited an average growth pattern. There was no symptoms of neuromuscular or mandibular dysfunction. Cephalometric analysis showed a full Class II molar and canine relationship; the mandible was short (SNB=75°) and retrusive (N₁-Pg = -3.5mm)(Fig-1)



Fig – 4. Mandibular push rod inserted just distal to canine

DIAGNOSIS

Based on extraoral, intraoral examination and cephalometric analysis she was diagnosed as Angle's class II division 1 malocclusion on class II skeletal bases with average growth pattern, proclined upper anterior with protrusive upper and lower lip. Increased overjet and overbite with increased interlabial gap and convex profile.

Problem List

Skeletal Problem: Class II skeletal base.

Dental Problem: Proclined upper anteriors, Mid-line diastema, increased overjet and overbite. Distal in rotation – 12 & 15.



Fig - 5. Comparison of Pre , Mid and Post treatment Intraoral photographs

Soft Tissue Problem: Protrusive upper and lower lips, Inter labial gap - 4mm.

TREATMENT OBJECTIVES

1. To achieve the class I molar relation and class I canine relation bilaterally.
2. To attain normal overjet and overbite.
3. To correct the inclination and align the proclined upper anteriors in the basal bone.
4. To correct the rotation of 12 & 15.
5. To attain lip competency.
6. To improve the smile and aesthetics and overall appearance .

TREATMENT PLAN

A nonextraction treatment plan was chosen, with the goal of reducing the overjet and overbite and correcting the Class II occlusion by using a Forsus FRD as a fixed functional appliance. For anchorage preparation Trans-palatal arch was given with banding of upper and lower second molars.

Treatment Progress

After leveling and alignment with .022" brackets and .016" round nickel titanium archwires in both the arches upper and lower .016" round stainless steel wires were placed with appropriate bite-opening bends, followed by upper and lower .017" × .025" stainless steel wires six weeks later . After 16 weeks of treatment, curve of spee got flattened and leveling



Fig – 6. Extra oral and Intraoral photographs after 18 months of treatment



Fig – 7. Comparison of Pre and Post treatment Lateral Cephalograph

Cephalometric values	pre	post
SNA	81°	80°
SNB	75°	78°
ANB	6°	2°
FMA	21°	23°
WITS APPRAISAL	+4.5mm	+2.5mm
Na per –pt A	2mm	0.5mm
Na per-pog	-3.5mm	-1mm
UI-NA	6mm/35°	5mm/28°
UI-SN	116°	108°
LI-NB	3mm/22°	6mm/30°
IMPA	92°	100°
LAFH	59mm	61.5mm
Nasolabial angle	82°	100°
Z-angle	65°	70°
E-line (Ricket's)	Upper+1mm Lower+1.5mm	Upper=-1.5mm Lower=+2mm

and alignment had been achieved adequately for placement of the Forsus FRD. Continuous elastic chain is placed to close midline diastema. Upper and lower .019" × .025" stainless steel wires were placed, with lingual crown torque of 10-15° in the lower anterior segment to counteract the protrusive effects of the Class II corrective forces, and pigtail ligation was used in both arches from first molar to first molar. Both archwires were cinched back for reinforced anchorage. The mandible was advanced to a Class I molar relationship, and the Forsus FRD was inserted bilaterally (Fig-4). Final arch coordination and detailing were completed, and all objectives were met after 15 months of treatment.

Treatment Results

Case was finished in Angle's class I molar relation and canine I relationship. Good overjet and overbite was achieved.

Positive facial changes were also achieved with sufficient increase in lower anterior face height (Fig-6.)

DISCUSSION

Fixed Functional Appliances offer an effective solution to treat young adult patients with Class II malocclusions post their peak pubertal growth period but who still have a small amount of residual growth left. Sood et al⁷ while evaluating muscle response during treatment of Class II Div 1 subjects with Forsus Fatigue resistant device concluded that though the Class II correction occurs in 3 months it is advisable to give the appliance at least six months for allowing adequate neuromuscular adaptation to occur for long term stability of the result.

The dentoalveolar changes were evident in both maxillary & mandibular arches (Fig-7). Maxillary incisors and first molars demonstrated distal movement and intrusion. Mandibular first molars showed mesial movement and extrusion. The correction of the overjet was achieved by the forward movement of the mandibular dentition as well as headgear like effect on the maxillary incisors. The correction of overbite was achieved by extrusion of mandibular molars and proclination of the lower incisors.

CONCLUSION

Thus to conclude Fixed Functional Appliances in general and the Forsus FRD in particular when used in conjunction with full bonded fixed appliance facilitate the correction of Class II Div 1 malocclusion and the duration of the treatment is also reduced. The improvement is mostly contributed by

skeletal changes that include an headgear like effect on the maxilla and distalisation of the maxillary molars, mesialisation of the mandibular molars and proclination of mandibular incisors⁸. The most likely reason for correction of the cephalometric parameters such as ANB angle and Wits is the forward posturing of the mandible due to the sagittal forces of the forsus FRD appliance¹⁰.

REFERENCES

1. Fixed functional appliances (Forsus) an effective solution to noncompliant patients: A case report of two cases
2. McNamara, J.A. Jr.: Components of Class II malocclusion in children 8-10 years of age, *Angle Orthod.* 51:177-202, 1981.
3. Sood, S.; Kharbanda Om, P.; Duggal, R.; Sood, M.; and Gulati, S.: Muscle response with flexible fixed functional appliance-an EMG study of masseter and anterior temporalis muscles, *Virtual J. Orthod.*, September 2010, <http://www.vjo.it>. Ross, A.P.; Gaffey, B.J.; and Quick, A.N.:
4. Graber, T.M.; Rakosi, T.; and Petrovic, A.: *Dentofacial Orthopedics with Functional Appliances*, C.V. Mosby Co., St. Louis, 1997, pp. 346-352.
5. McNamara, J.A. Jr.: Neuromuscular and skeletal adaptations to altered function in the orofacial region, *Am. J. Orthod.* 64:578-606, 1973.
6. Tulloch IFC, Phillips C, Proffit WR. Benefit of early Class II treatment: Progress report of a two-phase randomized clinical trial. *Am J Orthod Dentofac Orthop* 113:62-72, 1998.
7. SOOD S., *The Forsus Fatigue Resistant Device as a Fixed Functional Appliance JCO*, vol XLV(8), 2011
8. Ritto, A.K.: Fixed functional appliances—a classification, *Orthod. CYBERjournal*, 2001, <http://orthocj.com>. Pancherz, H.: Treatment of Class II malocclusions by jumping
9. Konik, M.; Pancherz, H.; and Hansen, K.: The mechanism of Class II correction in late Herbst treatment, *Am. J. Orthod.* 112:87-91, 1997.
10. Vogt, W.: The Forsus Fatigue Resistant Device, *J. Clin. Orthod.* 40:368-377, 2006. Jones, G.; Buschang, P.H.; Kim, K.B.; and Oliver, D.R. : Class II non-extraction patients treated with the Forsus Fatigue Resistant Device versus intermaxillary elastics, *Angle Orthod.* 78:332-338, 2008