

Treatment of Skeletal Class II Malocclusion Using a Fixed Functional Appliance

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ABSTRACT

Treatment of class II malocclusion has always been an enigma to the orthodontic fraternity. Noncompliant correction of class II malocclusion using fixed functional appliances at the deceleration stage of growth has gained tremendous popularity in the recent times. Aim of the illustrated article is to demonstrate the efficacy of a fixed functional appliance in correction of class II malocclusion. We are reporting a 12-year-old female patient with a skeletal class II malocclusion treated using the Forsus appliance. Forsus FRD was the best option considering age, patient comfort, ease of installation, predictable results and patient compliance. The appliance was worn for 5 months after the initial alignment with fixed mechanotherapy (MBT 0.022"). The mandible was brought forward to a class I skeletal and dental relationship by the end of this phase of treatment.

Keywords: Fixed functional appliance, Forsus, Class II malocclusion, Growth modulation.

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INTRODUCTION

Every orthodontist at some point in his clinical practice has faced the dilemma of how 'best' to manage class II malocclusion, which is by far one of the most common type of malocclusions encountered. Etiology of class II malocclusion may be due to heredity, abnormal intrauterine fetal pressure, birth injury, and traumatic injury to mandible or TMJ. It may be a dental class II or have a skeletal component. Skeletal class II jaw relation may be due to a prognathic maxilla, retrognathic mandible or a combination of both. Mandibular retrognathism may be due to small mandible, posterior placement of condyle in glenoid fossa or a functional retrusion.

Management of class II malocclusion depends entirely upon the severity of the problem and the age at which it presents for treatment. Numerous orthodontic techniques and appliances have been introduced to treat the same. Correction of skeletal class II malocclusion by growth modulation during active growth can be achieved using various myofunctional appliances like activator, Frankel's regulator and the twin block.^{1,2}

Treatment of class II malocclusion during deceleration stages of growth has been a challenge and a bone of contention for various schools of thoughts.³ Fixed functional

appliances like fixed twin block, Jasper Jumper, Herbst, universal bite jumper, Ritto appliance, Eureka spring, Forsus FRD can be given to achieve better esthetics and functional harmony. Above all, these require minimum patient compliance compared to the removable functional appliances.⁴

Amongst these, the fixed twin block is a bulky, rigid appliance that causes a lot of patient discomfort, is difficult to clean and restricts jaw movements.⁵ Though it has the advantage of not requiring patient compliance and can be used in a fully erupted permanent dentition, concurrently with brackets, it is cumbersome to install, prone to breakage, causes a lot of tissue impingement and is difficult to clean or remove.⁶ Intermaxillary elastics are another commonly used interarch method for class II correction but, rely heavily on patient compliance for their effectiveness.⁷ Poor cooperation can lead to poor treatment results and increased treatment time.^{2,8}

The Forsus FRD (3M Unitek Corp, Monrovia, California, USA) is one of the newest fixed functional appliances introduced. It offers the advantages of giving predictable results, can be used in noncompliant or handicapped patients, is easy to install, robust in clinical usage, less prone to breakages, shortens the duration of treatment and can make use of residual growth even beyond the pubertal growth spurt.⁹ From the patient's viewpoint, it allows freedom of jaw movements and no tissue impingement.⁹

Here, we are presenting a case of a class II skeletal malocclusion treated by using the Forsus appliance.

CASE REPORT

A 12-year-old girl reported to the Department of Orthodontics, MGM Dental College and Hospital, with the chief complaint of forwardly placed upper front teeth. There was no significant medical or dental history.

On extraoral examination, she had a symmetric, mesoprosopic face and a mesocephalic head form. Profile was convex, with incompetent lips, acute nasolabial angle and a deep mentolabial sulcus. Figure 1 shows her pretreatment extraoral photographs. The patient gave a positive visual treatment objective (VTO) on advancing the mandible to an edge to edge bite as depicted in Figure 2.

Intraoral examination showed Angle's class II molar relationship bilaterally, end on canine relationship on the right and class II on the left. She exhibited an increased



Fig. 1: Pretreatment extraoral photographs

overjet of 15 mm and a deep overbite of 8 mm. Spacing of 4 mm in the maxillary arch was present. Upper and lower midlines were coinciding with the facial midlines. Maxillary arch was constricted in the interpremolar as well as the intermolar regions. Figure 3 shows her pretreatment intraoral photographs.

Lateral cephalometric analysis showed skeletal class II malocclusion with retrognathic mandible. She had an average growth pattern. Maxillary incisors were proclined and forwardly placed while the mandibular incisors were upright. Cervical Vertebrae Maturity Index revealed that 10 to 25% of adolescence growth was expected (CVMI Stage IV–Deceleration Stage). Orthopantomogram (OPG) displayed all four 3rd molars in their formative stage.

TREATMENT PLAN

Nonextraction treatment modality using fixed mechanotherapy was planned. The appliance of choice was preadjusted edgewise, MBT 0.022" prescription. Leveling and alignment of both the arches was to be followed by closure of anterior spaces in the upper arch. Mandible was to be advanced using a fixed functional appliance. Forsus FRD was the appliance selected. Finally, finishing and detailing of occlusion in a class I molar and canine relationship bilaterally was planned.

TREATMENT PROGRESS

Treatment was started using upper and lower 0.016" NiTi wires for leveling and alignment of the arches. Maxillary second molars were also banded. This was followed by 0.016" × 0.022" heat activated NiTi, 0.017" × 0.025" NiTi, 0.019" × 0.025" NiTi and 0.019" × 0.025" stainless steel. Figure 4 shows her midtreatment extraoral and intraoral photographs. At this stage, both the arches were consolidated using continuous ligation. Forsus FRD (35 mm) was placed for 5 months (Fig. 5). Postfunctional records were taken. Upper and lower 0.016" stainless steel wires were placed for settling of occlusion in the premolar region. The patient is currently in the finishing stage Figures 6 to 9 show

pretreatment, prefunctional and postfunctional stage lateral cephalograms and OPGs.

DISCUSSION

Class II malocclusions resulting from mandibular retrusion are generally treated with functional orthodontic appliances that create orthopedic forces directed at the mandibular structures. These appliances influence the jaws via the following mechanisms: remodeling of the mandibular condyle, remodeling of the glenoid fossa, repositioning the mandibular condyle in the glenoid fossa, and autorotation of the mandibular bone.¹⁰

Over the years, many fixed functional appliances have been used by orthodontists and only a few have shown well acceptance and favorable results on the patient.^{11,12} Forsus appliance, which has been recently introduced, is well accepted showing stable results.¹³

The FRD is a three piece, semirigid telescoping system incorporating a superelastic nickel-titanium coil spring that can be assembled chairside in a relatively short amount of time. It is compatible with complete fixed orthodontic appliances and can be incorporated into pre-existing appliances. The FRD attaches at the maxillary first molar and onto the mandibular archwire, distal to either the canine



Fig. 2: A positive visual treatment objective

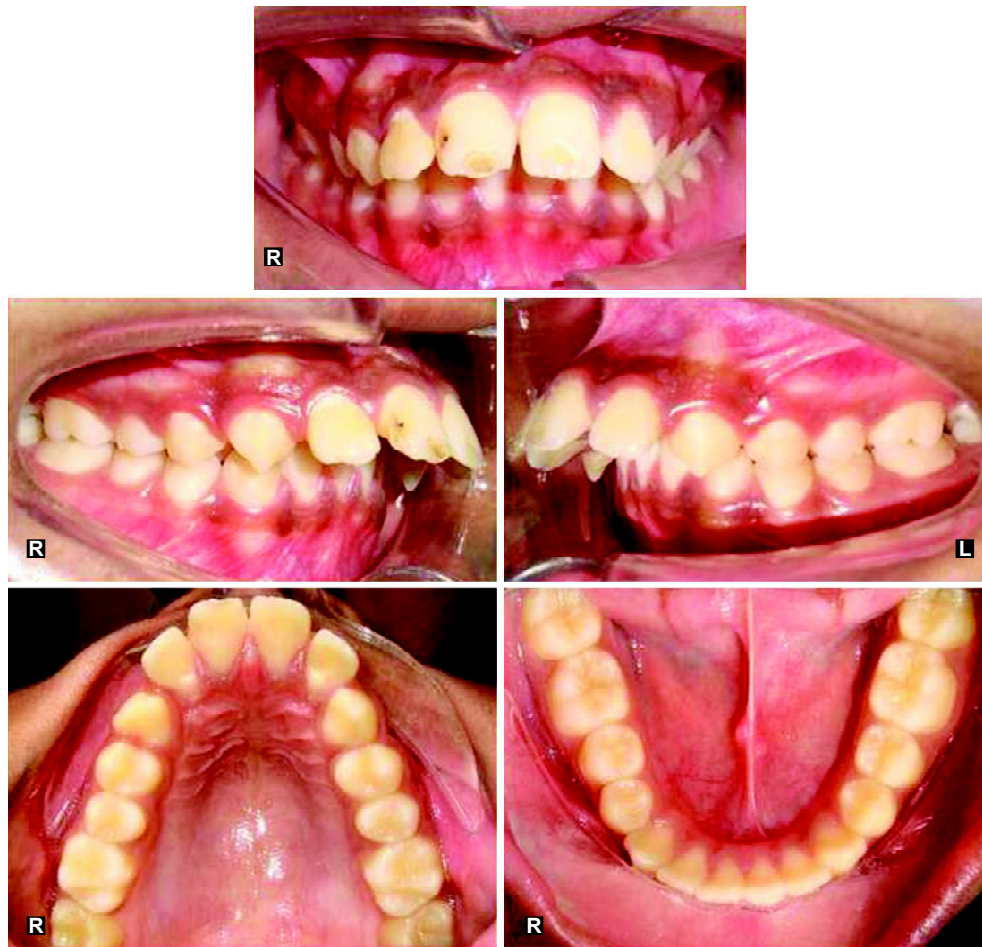


Fig. 3: Pretreatment intraoral photographs



Fig. 4: Midtreatment extraoral and intraoral photographs



Fig. 5: Placement of Forsus FRD



Fig. 6: Current stage extraoral photographs

or first premolar bracket. As the coil is compressed, opposing forces are transmitted to the sites of attachment.

Forsus FRD has long been proved to be one of the best treatment modality for class II malocclusion due to mandibular retrusion. It is capable of achieving class II correction in 3 to 6 months depending upon the baseline situation and the biological response.¹⁴ The correction achieved is by a combination of skeletal and dental effects, 66% being dental and remaining 34% skeletal.^{9,15}

Significant improvement was noted in the soft tissue profile of the patient (Fig. 10). The results achieved were

highly satisfying for both the clinician as well as the patient. Thus, Forsus FRD offers the following advantages to the clinician: predictable results,⁹ long-term reliability,¹⁶ can be used in noncompliant or handicapped patients,⁶ ease of installation (can be installed and removed in 5 minutes, and is activated in 30 seconds),⁴ less breakages and robust in clinical usage,¹⁷ shortens the duration of treatment,¹⁶ can make use of residual growth even beyond the pubertal growth spurt,¹⁷ Susceptibility to mechanical fatigue is negligible due to the spring. To the patient, it allows freedom of jaw movements and does not cause tissue impingement.⁹

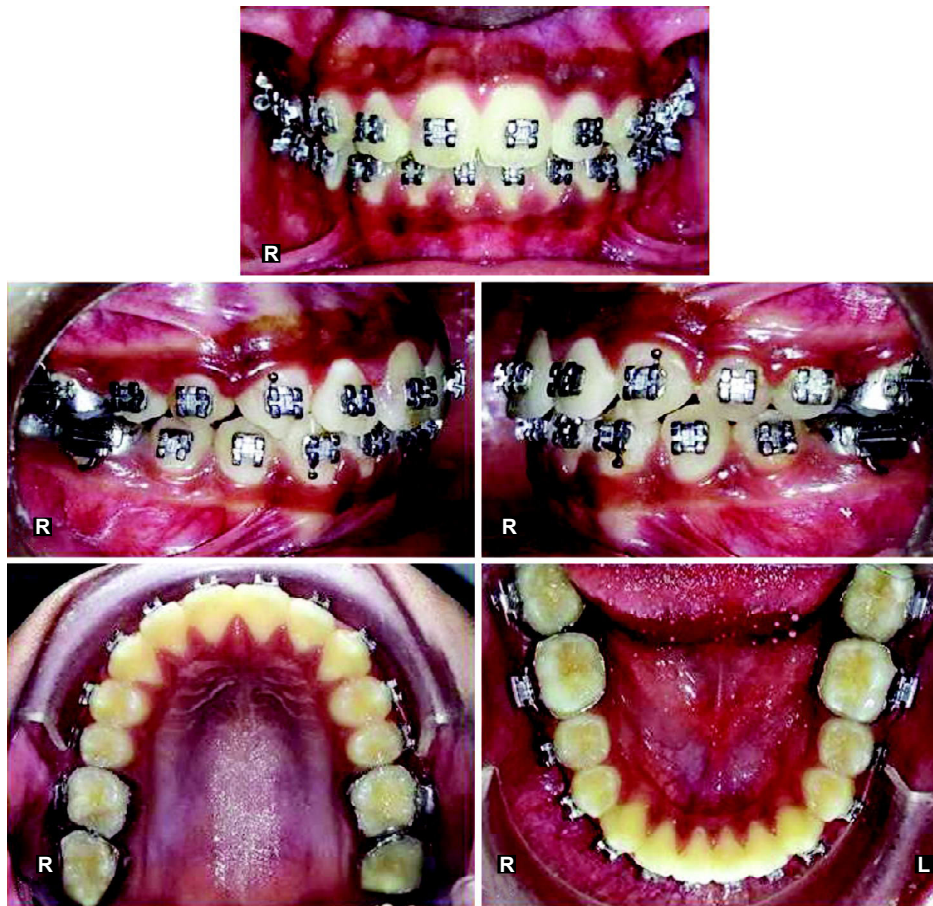


Fig. 7: Current stage intraoral photographs

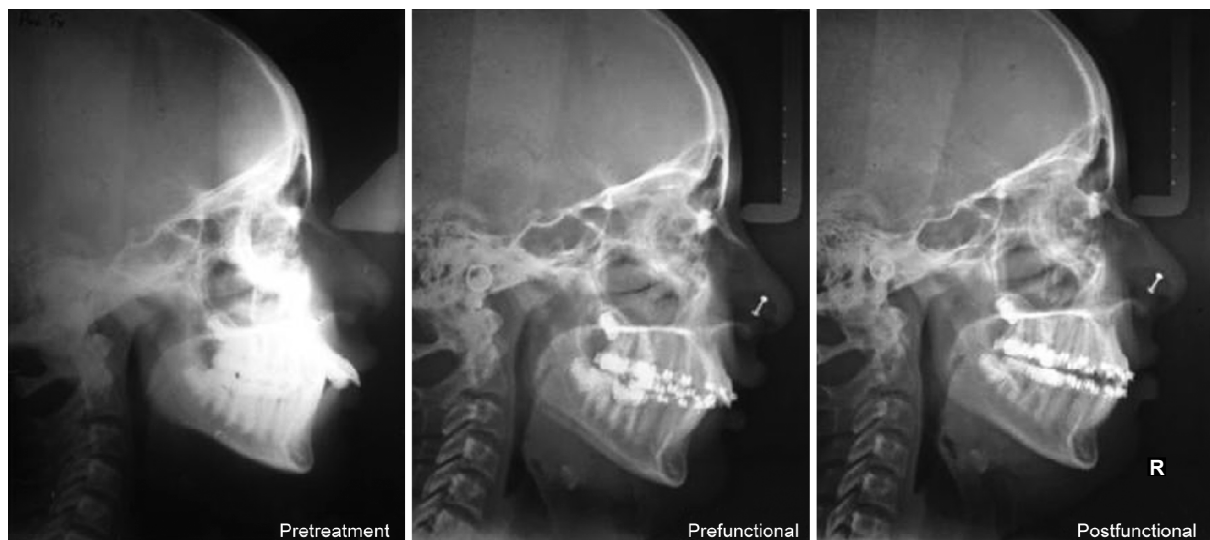


Fig. 8: Lateral cephalograms



Fig. 9: Orthopantomograms



Fig. 10: Pretreatment and current stage profile photographs

CONCLUSION

Most class II situations are on account of a functional retrusion of the mandible. It would be very unwise to consider extractions in such situations, especially when the patient is still growing. They are best managed by a non-extraction approach of mandibular advancement wherein a fixed functional appliance is the treatment of choice.

The Forsus is an effective and comfortable fixed functional appliance which is very effective in repositioning the mandible in a forward position for the treatment of skeletal mandibular retrognathism. The aforementioned advantages make it a comfortable alternative to conventional anterior repositioning appliances for class II correction in the deceleration stages of growth.

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