



## Management of Severe Class II Malocclusion with Fixed Functional Appliance: Forsus

PS Vijayalakshmi, AS Veereshi

### ABSTRACT

**Background:** Management of class II malocclusion in adolescent patients by growth modulation is one of the most debated topics in orthodontics. Noncompliance has been a major concern for orthodontists.

**Case report:** This case report describes the management of severe class II malocclusion in adolescent patient using functional appliance system—Forsus to correct class II problems, which is clipped on to bands. This appliance has several advantages, as the patient cannot remove it. It acts on the teeth and jaws for 24 hours each day, patient cooperation is not a problem, and as a result the treatment time is short. There is lot of controversy about the use of functional appliances.

**Conclusion:** This case report illustrates that even today, functional appliances have a significant role in the management of class II malocclusion by using growth modulation. The growth modulation minimizes the necessity of extraction of permanent teeth and probably orthognathic surgery.

**Clinical significance:** Functional appliances have a significant role in the management of class II malocclusion. The growth modulation minimizes the necessity of extraction of permanent teeth and probably orthognathic surgery.

**Keywords:** Class II malocclusion, Severe, Growth modulation and Forsus.

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**Conflict of interest:** None declared

### INTRODUCTION

Management of class II malocclusion by growth modulation in adolescent patients is one of the most debated topics in orthodontics. Lack of compliance in adolescent population has been a major concern of healthcare providers. Every orthodontist appreciates the seriousness of compliance.

Noncompliance has been a major concern for orthodontists for more than 40 years.<sup>1</sup> However, predicting compliance before treatment may be difficult.

Fixed appliance for class II correction requires minimal patient cooperation and they can be grouped into three categories based upon their mode of action.<sup>2</sup>

1. Rigid fixed functional orthopedic appliance *viz* herbst and its modifications.
2. Fixed maxillary appliances *viz* pendulum appliance. Apply class I force within maxilla. The resultant orthopedic and orthodontic effects are within the maxillary arch.
3. Interarch spring force delivery system *viz* Jasper Jumper, Forsus.

The following case report describes the management of severe class II malocclusion in an adolescent patient using Forsus, a fixed functional appliance in single phase treatment.

A 12-year-old adolescent female patient reported with a chief complaint of protruded front teeth.

Extraoral examination in frontal view revealed increased incisal exposure and lip incompetency. Profile view showed that she had a convex profile (Figs 1 A to C).

Intraoral findings were as follows: Severe increase in overjet of 12 mm, overbite of 6 mm, class II canine relation, upper dental midline shifted to right side by 1 mm and lower dental midline shifted to left side by 2 mm, class II molar relation on both right and left side, curve of Spee 4 mm (Figs 2A to C).

Cephalometric analysis revealed class II skeletal relation with ANB of 6°, increased proclination of maxillary anteriors with mild vertical growth pattern.

Orthopantomogram showed a full compliment of dentition with all the third molars present.

CVMI<sup>3</sup> assessment showed that the patient was in stage V (deceleration stage) of pubertal growth spurt.

## Diagnosis

Skeletal class II relation, Angle's class II division 1 malocclusion.

## Treatment Objective

Correct the skeletal class II relation to improve the convexity of the profile, occlusal objective was to achieve class I occlusion and to establish lip competency.

## Treatment Plan

To change the class II relation to class I without any premolar extraction, it was decided to treat this patient with fixed functional appliance Forsus (3M Unitek) in conjunction with preadjusted edgewise appliance in single phase. A 0.022" slot MBT prescription was used.

## Treatment Progress

After complete banding and bonding, leveling and aligning were done in both the upper and lower arch, until a 19 × 25" stainless steel wire could be passively placed. Individually both the arches were consolidated from molar to molar with figure of eight ligature tie and active bend back was placed in the archwire distal to the molar tube. Additional labial root torque was built into the anterior segment of lower archwire. The duration of prefunctional phase of treatment was 6 months.

Then Forsus appliance was inserted (Figs 3A to C). After two visits, a crimp was added on to the left side of Forsus for midline correction. Forsus was used for 12 months, a little longer than usual recommended duration. The occlusion was slightly overcorrected to class I, then Forsus was removed. Final finishing and detailing of occlusion were done which took about 4 months of time. After 22 months of treatment, the fixed appliance was debonded, a fixed retainer was bonded in the lower anterior region and wrap around retainer was fabricated for the upper arch.

## Cephalometric Analysis

Cephalometric reading	Pretreatment value	Posttreatment value
SNA	84°	83°
SNB	78°	79°
ANB	6°	4°
Upper incisor to SN	112°	101°
Upper incisor to palatal plane	120°	107°
Lower incisor to mandibular plane	92°	98°
Maxillomandibular plane angle	30°	30°

## PAR (Peer Assessment Rating) Index

Pretreatment PAR index score	Posttreatment PAR index score	Percentage of change
28	0	100%

## DISCUSSION

Management of class II malocclusion has wide spectrum of options. Since this patient was adolescent, it was decided to treat her with some form of growth modulation. The possible options are headgear to restrict the growth of maxilla, removable functional appliance and fixed functional appliance. Since, very little amount of active growth was left, we could not take a chance of patient's compliance, therefore, the option of using a headgear or removable functional appliance was ruled out. We could not use a rigid fixed functional appliance *viz* herbst, as we do not have the laboratory facility to fabricate herbst appliance. Hence, we decided to use flexible fixed functional appliance—Forsus.

The following changes were seen (Figs 4A to 5C) with this single phase treatment using fixed orthodontic appliance and Forsus: ANB angle was reduced from 6 to 4°. Upper incisor inclination with respect to palatal plane was reduced from 120 to 107°. Lower incisors were proclined by 6°. Maxillomandibular plane angle was not significantly altered. Overjet was reduced from 12 to 2 mm. Occlusion was changed from Angle's class II division 1 to normal class I occlusion. Convexity of facial profile was reduced (Fig. 6).

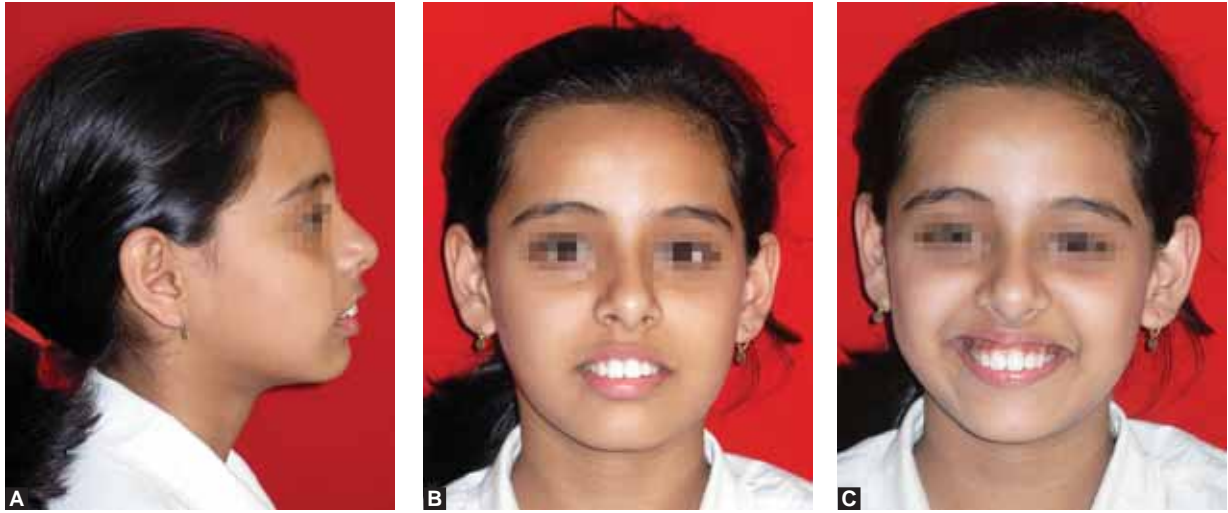
PAR index<sup>4</sup> score has changed from pretreatment value of 28 to posttreatment value zero, showing 100% change.

Pancherz<sup>5</sup> has emphasized the importance of good post-treatment intercuspation for preventing the dental and skeletal relapse of class II correction. Teeth locked in stable class I intercuspation are more likely to transfer maxillary growth forces to mandible.<sup>5</sup> This patient was in deceleration phase of growth spurt, when growth modulation treatment was done. Bacetti<sup>6</sup> suggests that growth modulation done after the peak of growth spurt/decelerating phase of active growth spurt, results in greater skeletal contribution to molar correction.

There are lots of questions about stability of class II correction with growth modulation.<sup>7</sup> In this patient, severe class II occlusion with 12 mm of overjet was very effectively treated to class I occlusion with very good posterior teeth intercuspation. Posttreatment results are absolutely stable one year after debonding (Figs 7A to C). Class II malocclusion treated with growth modulation during the pubertal growth spurt induces significant favorable dentoskeletal and occlusal changes.<sup>8</sup>

Fixed functional therapy is reported to cause a posterosuperior displacement of the maxillary dentition and pterygoid plate along with forward displacement of mandibular dentition and, thus, can contribute to the correction of class II malocclusion.<sup>9</sup>



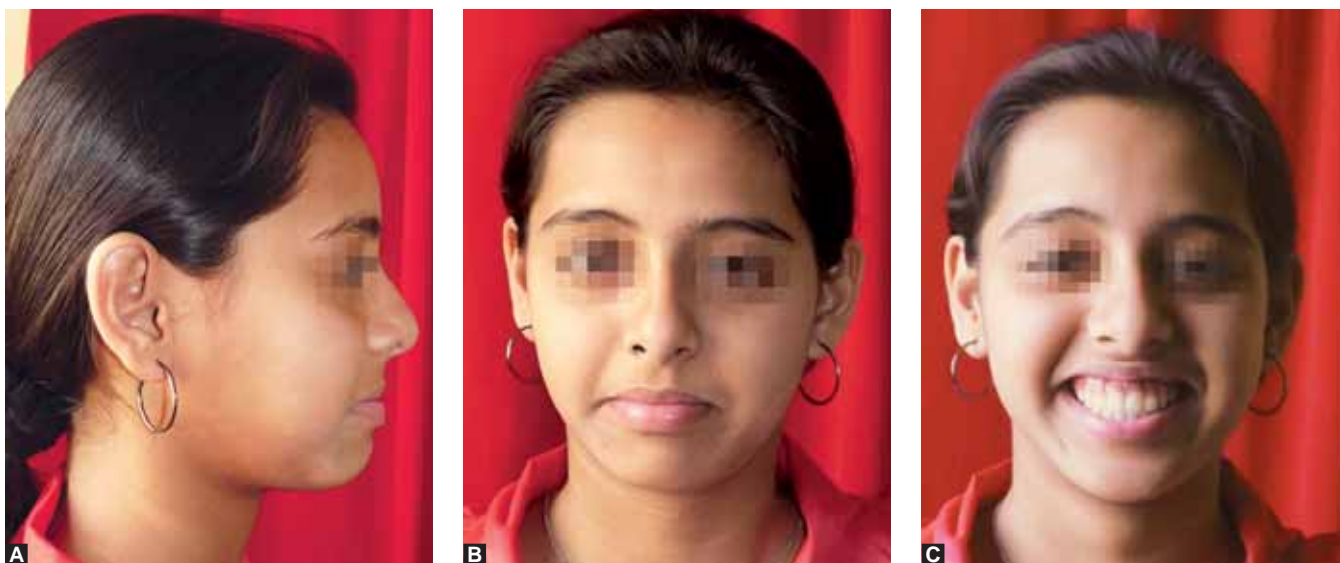


Figs 1A to C: Pretreatment extraoral photographs

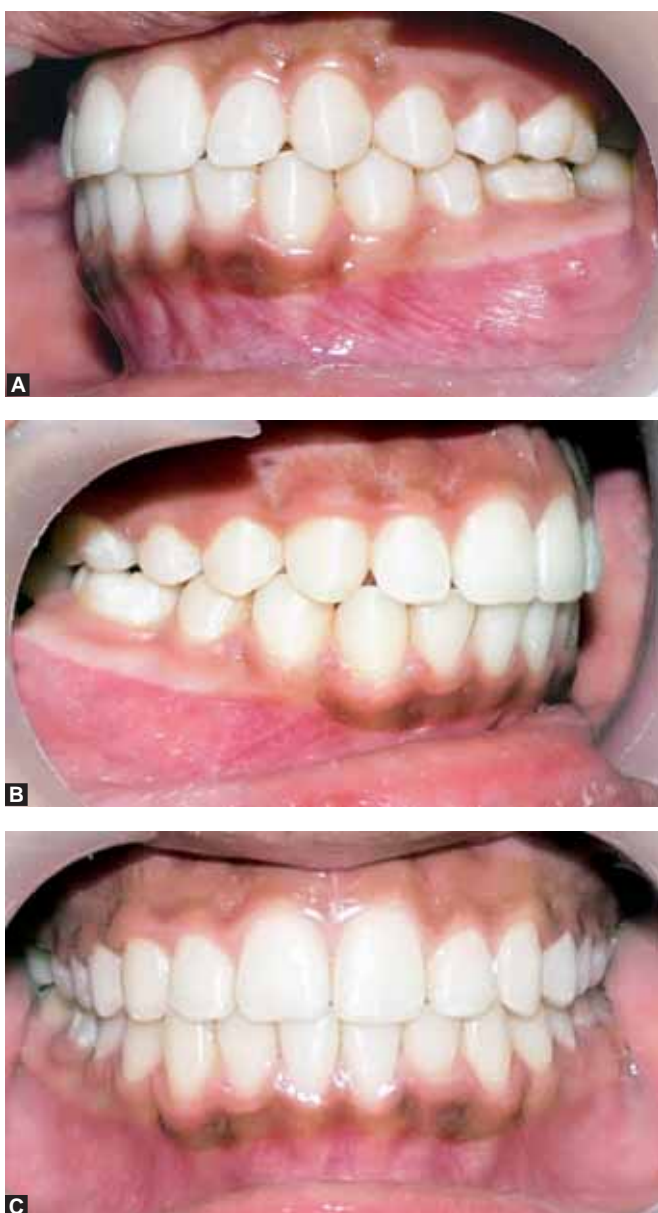


Figs 2A to C: Pretreatment intraoral photographs

Figs 3A to C: During treatment intraoral photographs with Forsus



Figs 4A to C: Posttreatment extraoral photographs



Figs 5A to C: Posttreatment intraoral photographs



Fig. 6: Superimposition of pre- and posttreatment lateral cephalogram on Sella-Nasion plane. Pretreatment tracing is in black color ink and posttreatment tracing is in red color

The advantage of choosing growth modulation mode of treatment in this case was, it avoided the necessity of premolar extraction and an orthognathic surgery at a later stage.

The use of this *viz* Forsus appliance helps to integrate the functional and fixed appliance phases of therapy into single phase of treatment and minimizes the duration of treatment. Patient compliance will not be a limiting factor. Though the appliance brings about class II correction largely through dentoalveolar effects, a favorable change in the soft tissue profile with reduction in facial convexity is seen with this appliance.

**CONCLUSION**

In spite of all the present controversies about the growth modulation or functional appliances, even today functional appliances can be very useful tool in managing a class II malocclusion.





**Figs 7A to C:** Intraoral photographs one year after debonding

Functional appliances have a significant role in the management of class II malocclusion by using growth modulation. The growth modulation minimizes the necessity of extraction of permanent teeth and probably orthognathic surgery.

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