Case Report

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Dentistry Section

Non-extraction Camouflage of Class II Malocclusion using Forsus Fatigue Resistance Device in a Late Adolescent: A Case Report

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ABSTRACT

Management of Class II malocclusion in late adolescents pose a therapeutic challenge due to the limited growth potential and the need to achieve balanced occlusal correction with facial aesthetics. While fixed functional appliances such as the Forsus Fatigue Resistance Device (FRD) are widely used during active growth phases, literature describing their application in growth-limited individuals is comparatively limited; particularly in patients with a horizontal growth pattern, where vertical control is critical. The present case presents a detailed description of a 19-year-old female patient with Class II malocclusion and its management by non extraction approach using Forsus FRD. Growth assessment was performed using cervical vertebral maturation indicators, confirming minimal residual growth potential. The present report focuses on treatment planning considerations, appliance selection and role of dentoalveolar camouflage in achieving functional occlusal correction, when growth modification is no longer possible. The case highlights the role of controlled biomechanics and torque management in achieving predictable dentoalveolar camouflage while minimising undesirable effects in late adolescent patient. Forsus FRD was delivered after alignment and levelling on a rigid stainless steel archwire with emphasis on incisor torque control. Active Forsus therapy was carried out for seven months, contributing in correction of molar and canine relationships and reduction in overjet. The total treatment duration was 24 months. Post-treatment results demonstrated achievement of bilateral Class I molar and canine relationships, improved facial profile, and satisfactory occlusal stability. Follow-up at six months showed stable results. The present case report addresses the limited evidence on the use of Forsus FRD in late adolescents with minimal growth potential and horizontal growth pattern.

Keywords: Angle class II, Functional, Orthodontic appliances, Treatment outcome

CASE REPORT

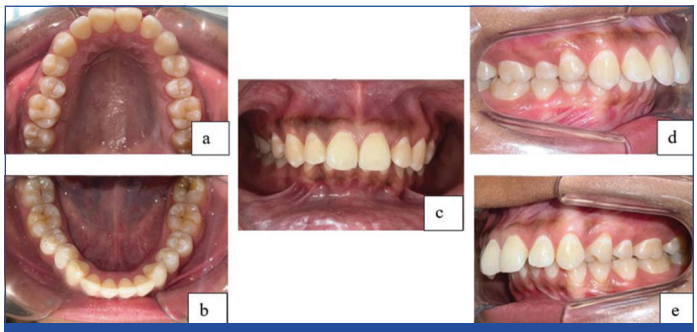
A 19-year-old female patient reported to the Department of Orthodontics and Dentofacial Orthopaedics with the chief complaint of forwardly placed upper front teeth. The patient was psychosocially affected with her facial aesthetics. The patient had no relevant medical or dental history. No history of parafunctional habits such as thumb sucking, tongue thrusting or bruxism was reported.

Extraoral examination revealed a mesocephalic head form with a leptoprosopic face form. The patient had a convex facial profile with retropositioned chin, potentially competent lips, an Acute Nasolabial Angle (NLA) and a Deep Mentolabial Sulcus (DMS). Her smile was symmetrical and non consonant with an increased incisor display of more than 90% [Table/Fig-1a-c].



[Table/Fig-1]: Pretreatment extraoral photographs: a) Frontal view; b) Frontal view smiling; c) Lateral view.

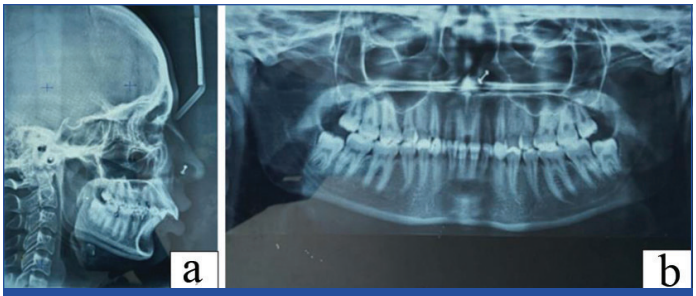
Intraoral examination revealed that all teeth are present in both maxillary and mandibular arches except for third molars in mandible. Angle's Class II Division 1 malocclusion with bilateral Class II molar and canine relationship was observed in the patient with an increased overjet of 9 mm and presence of deep overbite of 6 mm. Spacing was seen in maxillary anterior region between right canine and premolar and left lateral and canine. Anterior teeth in both arches were proclined and a scissor bite was noted in relation to the maxillary first premolars [Table/Fig-2a-e].



[Table/Fig-2]: Pretreatment intraoral photographs: a) Maxillary occlusal view; b) Mandibular occlusal view; c) Frontal view in occlusion; d) Right molar in occlusion; e) Left molar in occlusion.

Cephalometric analysis confirmed a skeletal class II pattern with a retrognathic mandible and a horizontal growth pattern. Analysis of the soft-tissue demonstrated an acute NLA and DMS. Growth assessment was performed using the Cervical Vertebral Maturation Index (CVMI), which indicated stage 5, confirming minimal residual growth potential and supporting a camouflage treatment approach. Orthopantomographic analysis showed the complete dentition with developed third molars, a normal condyle to glenoid fossa relationship and no apparent pathology [Table/Fig-3a,b].

The problem list was prioritised as follows:



[Table/Fig-3]: a) Pretreatment lateral cephalogram; b) Pretreatment orthopantomogram.

Skeletal: Class II skeletal pattern characterised by a retrognathic mandible and retropositioned chin.

Dental: Proclination of maxillary and mandibular incisors, increased overjet and overbite, bilateral Class II molar and canine relationship and presence of scissor bite in relation to the maxillary first premolars.

Soft-tissue: Potentially competent lips with a convex facial profile.

Treatment Plan

Based on the clinical and radiographic findings, the treatment objectives were as follows [Table/Fig-4]:

Taking into consideration the patient's age, facial profile and dentoalveolar features, a non extraction treatment approach was planned. Alternative treatment options included extraction therapy to reduce incisor proclination and overjet and orthognathic surgery for skeletal correction.

Extraction was not preferred due to the patient's acceptable soft-tissue profile and potentially competent lips, where further retraction could compromise facial aesthetics. Surgery was ruled out due to patient preference and moderate skeletal discrepancy. Therefore, a non extraction camouflage approach was selected. A Visual Treatment Objective (VTO) was considered to assess anticipated dentoalveolar and soft-tissue changes.

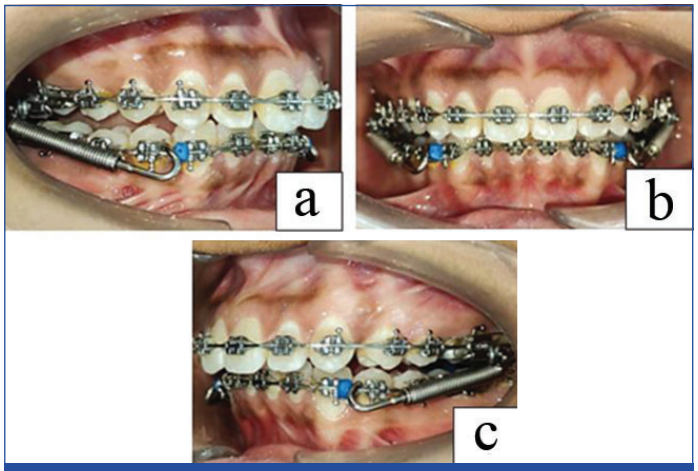
Treatment objective	How it was achieved
Correct sagittal discrepancy	Forsus FRD appliance therapy
Reduce overjet and overbite	Incisor alignment with fixed appliance and Forsus FRD therapy
Control incisor proclination	0.019×0.025 SS archwire with torque control
Achieve Class I canine and molar relation	Forsus FRD appliance therapy
Correct scissor bite	Arch coordination during levelling and alignment
Improve facial profile	Dentoalveolar camouflage

[Table/Fig-4]: Treatment objective.

Treatment Progress

The treatment commenced after motivating and educating the patient regarding the treatment approach. Written informed consent was obtained from the patient regarding the same and this also included the consent for publication of clinical photographs for academic purposes. Following oral prophylaxis, the next phase of treatment began by using fixed orthodontic appliance with McLaughlin, Bennett, and Trevisi (MBT) 0.022×0.028 bracket slot prescription. Banding of upper and lower molars was done along with bonding of upper and lower arches. Initial levelling and alignment was carried out for both arches using 0.016 NiTi, 0.016×0.022 NiTi, 0.016×0.022 SS, 0.017×0.025 NiTi, 0.017×0.025 SS, 0.019×0.025 NiTi and 0.019×0.025 SS wires. This phase involved inclination and rotation correction of teeth followed by space closure in the maxillary arch.

Forsus FRD was delivered after levelling and alignment on 0.019×0.025 SS archwire. An Easy 2 (EZ2) module delivering approximately 200-250 g of force was attached from the maxillary first molar to the mandibular arch distal to canine. Activation was carried out using crimpable stops at 4-6 weeks intervals and the appliance was maintained for seven months. Mandibular incisor proclination was controlled using lingual root torque and archwire cinching. Thus, correction of class II molar and canine relationship was achieved using the Forsus FRD [Table/Fig-5a-c].

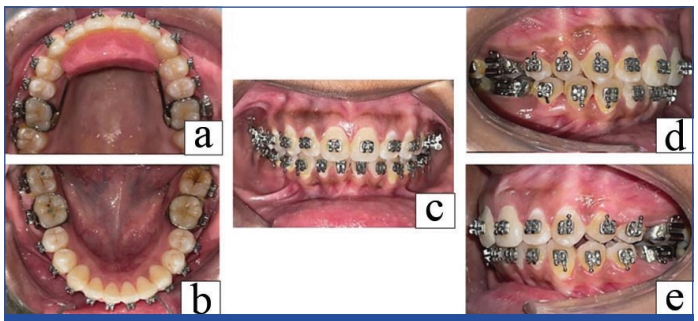


[Table/Fig-5]: Mid-treatment intraoral photographs showing Forsus FRD appliance: a) Right buccal view; b) Frontal view; c) Left buccal view.

Following completion of the active Forsus appliance therapy phase, the intraoral and extraoral photographs demonstrated improvement in sagittal relationship and overjet correction [Table/Fig-6,7].



[Table/Fig-6]: Post Forsus FRD appliance therapy extraoral photographs: a) Frontal view; b) Frontal view smiling; c) Lateral view.



[Table/Fig-7]: Post Forsus FRD appliance therapy intraoral photographs: a) Maxillary occlusal view; b) Mandibular occlusal view; c) Frontal view in occlusion; d) Right molar in occlusion; e) Left molar in occlusion.

After finishing and detailing, clinical and cephalometric assessment after treatment showed a bilateral Class I molar and canine relationship with ideal overjet and overbite, resulting in satisfactory outcome [Table/Fig-8-10]. Before and after evaluation of cephalometric parameters can be appreciated [Table/Fig-11]. The total treatment duration was 24 months. The levelling and alignment phase lasted 10 months, followed by active Forsus therapy for seven months. The remaining seven months were dedicated to finishing and detailing, settling of occlusion and preparation for retention phase.

The patient was followed-up for six months post-treatment, during which stability of occlusion and facial profile was maintained.

DISCUSSION

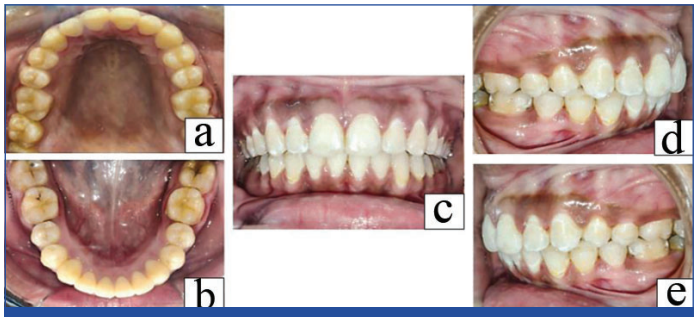
The management of Class II malocclusion remains a complex clinical challenge due to its multifactorial aetiology which involves



[Table/Fig-8]: a) Post-treatment lateral cephalogram; b) Post-treatment orthopantomogram.



[Table/Fig-9]: Post-treatment extraoral photographs: a) Frontal view; b) Frontal view smiling; c) Lateral view.



[Table/Fig-10]: Post-treatment intraoral photographs: a) Maxillary occlusal view; b) Mandibular occlusal view; c) Frontal view in occlusion; d) Right molar in occlusion; e) Left molar in occlusion.

Measurement	Mean value	Pre treatment	Post treatment
SNA	82°	81°	81°
SNB	80°	75°	77°
ANB	2°	6°	4°
Go-Gn to SN	32°	25°	26°
IMPA	90°	113°	117°

[Table/Fig-11]: Cephalometric readings.
SNA: the angle between the sella-nasion plane and the nasion-A plane; SNB: the angle between the sella-nasion plane and the nasion-B plane; ANB: the angle between the A-nasion plane and the nasion-B plane; Go-Gn to SN: the angle between the Gonion-Gnathion plane and the Sella-Nasion plane; IMPA: Incisor mandibular plane angle

various skeletal and dental components [1,2]. The present case highlights the effectiveness of Forsus FRD in late adolescents with minimal growth potential and a horizontal growth pattern, where vertical control is critical, a scenario with limited representation in existing literature.

The treatment approach depends on growth status, severity of discrepancy and facial aesthetic considerations. In late adolescent patients, where residual growth potential is minimal, sagittal correction is primarily achieved through dentoalveolar camouflage than true skeletal modification [3,4]. Treatment options in this age group typically include extraction camouflage, orthognathic surgery or fixed appliance therapy. Though extraction approach is effective in reducing overjet, it may adversely affect the facial profile in patients with potentially competent lips and acceptable soft tissue balance [1,5]. On the other hand, surgical correction may not always be indicated or accepted by the patient.

The Forsus FRD offers a compliance-free alternative that allows sagittal correction through continuous force application during fixed appliance therapy [6,7]. Unlike intermaxillary elastics, which depend heavily on patient cooperation, Forsus provides sustained mechanics, making it particularly useful in late adolescent patients. A systematic review and meta-analysis by Linjawi AI and Abbassy MA reported that Forsus therapy predominantly produces dentoalveolar effects which include mandibular incisor proclination, maxillary incisor retroclination and limited skeletal changes [8]. In the present case, a non extraction camouflage approach was selected considering the patient's age, horizontal growth pattern and soft-tissue profile. Post-treatment cephalometric evaluation demonstrated improvement in ANB from 6° to 4°, with a modest increase in SNB from 75° to 77°, reflecting controlled sagittal correction that is consistent with previously reported findings in non-growing patients [6,9].

Mandibular incisor proclination and vertical changes are recognised side-effects of fixed functional therapy [8,10]. This is particularly relevant in patients with a horizontal growth pattern, where biomechanical control is essential to prevent excessive dental compensation. A sequential archwire progression from NiTi to SS was followed. Forsus FRD was delivered on 0.019×0.025 SS to ensure rigidity and control. Mandibular incisor proclination was minimised by incorporating lingual torque and cinching of the archwire. In the present case, Incisor-Mandibular Plane Angle (IMPA) increased by 4°. Improvement in facial profile and soft tissue balance was noted post-treatment, in agreement with studies demonstrating favourable soft-tissue adaptation following Forsus appliance therapy in young adults [6,7,9,11]. Similar findings have been reported in late adolescent patients, where sagittal correction is primarily dentoalveolar with minimal skeletal changes [4,6,9,12].

Although fixed functional appliances are effective in sagittal correction, long-term stability depends on appropriate retention and maintenance of intercuspation [6,12]. In present case, retention was achieved using an anterior inclined plane. The total treatment duration was 24 months. The levelling and alignment phase lasted 10 months, followed by active Forsus therapy for 7 months. The remaining seven months were dedicated to finishing and detailing, settling of occlusion and preparation for retention phase. The patient was followed-up for six months post-treatment, during which stability of occlusion and facial profile was maintained.

The present case highlights that, with careful case selection and controlled mechanics, Forsus FRD can serve as an effective non extraction modality for managing Class II malocclusion in late adolescents.

CONCLUSION(S)

Management of Class II malocclusion in late adolescents requires realistic treatment objectives since skeletal changes are limited beyond peak growth phase. In such cases, dentoalveolar camouflage becomes the primary mechanism for sagittal correction. The present case demonstrates that the Forsus FRD can serve as an effective, compliance-independent modality for non extraction correction of Class II malocclusion in growth-limited patients. Successful outcomes depend on appropriate case selection, careful biomechanical control and consideration of facial aesthetics. Long-term success relies on proper retention and maintenance of occlusal stability.

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