

Case Report

Treatment of Class II division 1 malocclusion using forsus fatigue-resistant device

ABSTRACT

Functional orthopedic appliances are mostly used to treat Class II malocclusion originated from mandibular retrusion. Removable or fixed functional appliances are available to advance the mandible. Fixed appliances can be treated in tandem with multibracket therapy, thus making it a single-phase treatment. The major disadvantage of fixed functional appliances is proclination of lower anterior teeth. To reduce this proclination, miniplates or miniimplants are being used; negative torque is added to the lower incisors. Despite these additions, the proclination could not be eliminated but minimized. This case report documents the successful treatment of skeletal Class II in late stages of puberty using forsus fatigue resistance appliance with soldered hooks placed distal to the lower canines.

Keywords: Class II malocclusion, Forsus Fatigue-Resistant Device, soldered hooks

INTRODUCTION

Class II malocclusion is one of the most frequent problems in orthodontics, as it affects one-third of patients seeking orthodontic treatment. According to McNamara, the most common characteristic of Class II malocclusion is mandibular retrusion, rather than maxillary prognathism.^[1] Thus, among the various orthodontic appliances introduced to treat Class II malocclusion, functional orthopedic appliances are widely used. Contrary to removable appliances, fixed devices do not require the patient's collaboration and can be worn in association with multibracket therapy so that Class II malocclusion can be corrected in a single-phase treatment.^[2] The appliances force the mandible forward, and using adaptational growth in the mandibular condyle and glenoid fossa remodeling, a significant increase in the mandibular effective length and a correction in facial convexity are attained.^[3] Fixed functional appliances can be grouped into rigid (Herbst) or flexible (Jasper Jumper, Forsus Fatigue Resistance Device [FRD]) devices.

The current article presents a case, treated successfully with FRD. It consists of a universal spring module, an "L" pin and a push rod that is available in five different sizes. It is

assembled so that the appropriately sized push rod attaches directly to the lower archwire distal to the canine teeth and the spring to the headgear tube through the "L" pin.^[4]

The main functions of the FRD appliance are restraining sagittal maxillary growth, stimulating mandibular growth, inducing mesial movement of the mandibular arch, and distal movement of the maxillary arch.^[2]

However, one major side effect of FRD as with any functional appliances is undesirable tooth movement of the lower incisors. The protrusion of the lower incisors limits skeletal correction, and the results are more prone to relapse.^[5]

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How to cite this article: Reddy SB, Jonnalagadda VN. Treatment of Class II division 1 malocclusion using forsus fatigue-resistant device. *Int J Orthod Rehabil* 2018;9:168-72.


Access this article online	
Website: www.orthodrehab.org	Quick Response Code 
DOI: 10.4103/ijor.ijor_19_18	



Figure 1: Pretreatment extraoral and intraoral photographs

CASE REPORT

A female patient of 15 years visited our clinic with a chief complaint of forwardly placed upper front teeth. She had convex profile, posterior divergence with deep mentolabial sulcus, and everted lower lip. She had Class II molar relation on either side with spacing in upper anterior, increased overjet of 11 mm, and 100% deep bite [Figures 1 and 2]. Cephalometric analysis reveals Class II skeletal jaw bases ($ANB = 5.3^\circ$) with retrognathic mandible ($SNB = 74.0^\circ$) and hypodivergent growth pattern (SN to mandibular plane = 24.6°) [Figures 3 and 4].

The patient was diagnosed with angles Class II division 1 malocclusion due to mandibular retrusion with deep bite. The objectives of the treatment were to correct Class II jaw bases and Class II molar relation and to achieve ideal overjet and overbite. FRD was planned to use for the patient to correct jaw bases and also for the dentoalveolar correction.

Treatment progress

Treatment was started with 0.022 MBT bracket system. Initial leveling and aligning were done with 0.016 superelastic NiTi wires. The archwires were changed progressively till 19×25

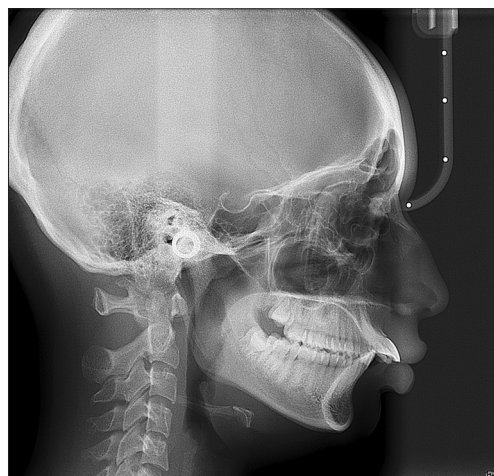


Figure 2: Pretreatment lateral cephalogram

stainless steel wires were reached. Soldered hooks were fabricated distal to lower canines. These hooks were made only to avoid direct force application on to canines from FRD, hoping that it would minimize lower incisor proclination. FRD was placed for 6 months for the sagittal and vertical correction. At the end of the treatment, ideal overjet and overbite were achieved with Class I molar relation. The patient ended up with white spot lesions on her teeth due to improper oral hygiene [Figures 4-9].

DISCUSSION

Various orthodontic techniques and appliances have been introduced to treat Class II malocclusions, including removable and fixed appliances, extraoral appliances, selective extraction patterns, and surgical option. The severity of the problem and the anticipated patient cooperation play an important role in appliance selection. The case reported in this article is a young female patient at the late stage of the puberty with skeletal Class II malocclusion due to mandibular retrusion.^[6] When orthodontic therapy of Class II malocclusion is completed at late puberty, close to completion of active craniofacial growth, relapse tendency due to a reestablishment of Class II growth characteristics is expected to occur less often. It has been shown that fixed functional appliances enhance mandibular growth and that they tend to produce a more horizontal condylar growth compared with removable functional appliances. The dentoalveolar changes were evident at both maxillary and mandibular arches.^[7]

Maxillary incisors and first molars demonstrated distal movement and intrusion. This significant effect on maxillary incisors despite the attachment to maxilla is at the molar tubes is because the entire maxillary arch is consolidated

by multibracket appliance. Mandibular first molars showed mesial movement and extrusion, and lower incisors exhibited proclination. The correction of the overjet was achieved by both retroclination of the upper incisors and protrusion of the lower incisors [Table 1]. The changes were dentoalveolar than skeletal. Similar changes were also reported in other studies.^[2,5] Application of negative torque to the lower incisors, soldered hooks distal to lower canines, and tight cinch back of the lower archwire distal to mandibular first molars did not eliminate the unfavorable lower

Table 1: Comparison of pretreatment and posttreatment cephalometric values

Measurements	Pretreatment	Posttreatment
SNA (°)	79.3	78.0
SNB (°)	74.0	75.8
ANB (°)	5.3	2.2
Go-Gn - SN (°)	23.4	24.4
WITTS (mm)	9.6	1.1
FMA (°)	23.8	24.2
IMPA (°)	103	110.4
UI-LI (°)	95.1	106.8



Figure 3: Pretreatment orthopantomogram



Figure 4: Mid-treatment intraoral photographs



Figure 5: Intraoral photographs showing Forsus Fatigue Resistance Device



Figure 6: Intraoral photographs after Forsus Fatigue Resistance Device removal



Figure 7: Posttreatment extraoral and intraoral photographs

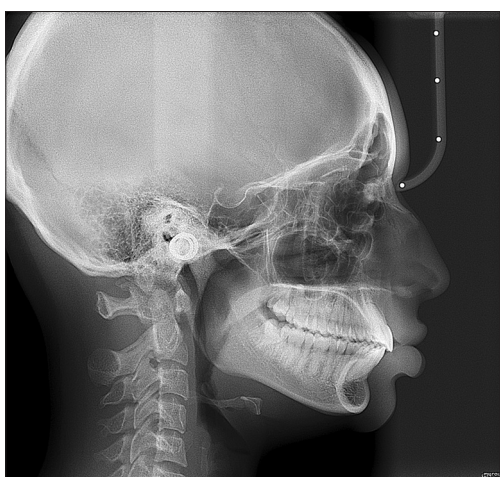


Figure 8: Posttreatment lateral cephalogram

incisor protrusion. Even with these anchorage mechanics, mandibular incisors were proclined by 6°.

Miniscrews or miniplates were being used in tandem with FRD to address lower incisor proclination. Studies of FRD with miniscrew have shown that Class II correction

was totally dentoalveolar, and unfortunately, miniscrew anchorage did not enhance mandibular forward growth or limit proclination of the lower incisors.^[8] Aslan *et al.* used Forsus with two miniscrews and reported that the protrusion of lower incisors was effectively minimized compared with the conventional Forsus, but it was not totally eliminated.^[9] Furthermore, at least two surgical operations are needed to insert and remove miniplates, poor oral hygiene may cause severe inflammation and mobility around the miniplates and increased costs of orthodontic treatment limit its usability.^[3]

CONCLUSION

The FRD protocol revealed to be effective in correcting Class II malocclusion at late puberty mainly at the dentoalveolar level. Lower incisor proclination can be minimized but not completely eliminated despite the anchorage mechanics used along with FRD.

Financial support and sponsorship

Nil.



Figure 9: Posttreatment orthopantomogram

Conflicts of interest

There are no conflicts of interest.

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