CASE REPORT

CORRECTION OF CLASS II DIVISION 2 MALOCCLUSION BY FIXED FUNCTIONAL APPLIANCE (FORSUS) - A CASE REPORT

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ABSTRACT

This case report describes the orthodontic management of a 15-year-old patient with a Class II Division 2 malocclusion using utility arch and a fixed functional appliance. The treatment aimed to correct the deep overbite, retroclined upper incisors and mandibular retrusion. A fixed functional appliance (Forsus™ Fatigue Resistant Device) was used following initial leveling and alignment. Post-treatment results demonstrated correction of the Class II skeletal and dental relationships, improved facial profile, and stable occlusal outcome.

KEY WORDS

Forsus, Class II division 2 malocclusion, Fixed functional, utility arch.

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INTRODUCTION

Class II Division 2 malocclusion is characterized by a retrusive mandible, deep overbite, and retroclined maxillary central incisors, often accompanied by a horizontal growth pattern and competent lips. The perioral soft tissue features of the malocclusion such as the hyperactive mentalis muscle and the high lip line are the etiologic factors of the steep upper incisor position[1]. This malocclusion is also associated with an abnormal pattern of mandibular posture and closure that makes the diagnosis and treatment most intriguing[2]. Several treatment options are available for correction of class II div 2 cases depending on the growth and severity of the skeletal jaw base discrepancy in antero-posterior and vertical direction. In Class II patients with mild-to-moderate skeletal discrepancies, orthodontic camouflage may well be the treatment of choice[3]. It involves intrusion and proclination of the upper incisors during the initial phase of treatment, thereby unlocking the malocclusion that in turn permits a modification in the path of closure of mandible and aids in the correction of Class II molar relationship[2,4].

Fixed functional appliances like the **Forsus™ Fatigue Resistant Device** are widely used for non-compliant Class II correction as they continuously apply mandibular advancement forces without relying on patient cooperation. This case report presents a successful correction of a skeletal Class II Division 2 malocclusion using the Forsus appliance in an adolescent patient.

DIAGNOSIS

A 15 year old female with a convex facial profile came to the Department of Orthodontics & Dentofacial Orthopedics at Dr. R. Ahmed Dental College & Hospital, Kolkata with the chief complaint of backwardly placed upper front teeth. Her medical and dental history revealed no previous maxillofacial or dental trauma or symptoms typically associated with the temporomandibular joint.

On clinical examination, she had a convex profile, posterior divergence, competent lips, obtuse

nasolabial angle, deep mentolabial sulcus, low mandibular plane angle, decreased lower facial height and non-consonant smile arc.

On functional examination, there was no signs and symptoms of temporomandibular joint dysfunction. Intraoral examination revealed a class II molar relation bilaterally, Class II Canine relation, retroclination of upper central incisors overjet of 1mm and overbite of 7 mm with lower midline shift to left by 1 mm.

Cephalometric analysis indicated a Class II skeletal relationship (ANB 10º), retrognathic mandible, average mandibular plane angle (Go Gn to SN =32º), decreased lower anterior face height and retroclined upper central incisors.

Model analysis showed an arch length tooth size discrepancy of 1 mm in upper arch and 3.75 mm in the lower arch.

TREATMENT OBJECTIVES

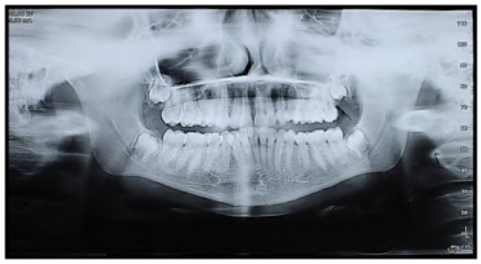
1. to correct the deep overbite,
2. to establish class I molar and canine relation,
3. to obtain normal overjet and overbite.
4. to flatten the curve of spee.
5. to improve the smile arc and soft tissue esthetics.

TREATMENT ALTERNATIVES

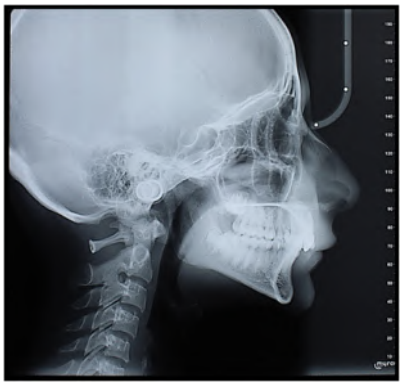
Treatment options for correction of skeletal ClassII Div2 malocclusion include orthodontic camouflage or orthognathic surgery. However, this patient was treated with orthodontic camouflage because the severity of the sagittal and vertical jaw base discrepancy did not warrant surgery. Moreover, long term studies of Class II malocclusion comparing camouflage and surgery showed similar reports of overall satisfaction with both the treatment modalities, with the camouflage group having fewer functional and temporomandibular joint problems[7].

Pre Treatment Extraoral Photographs

Pre Treatment Intraoral Photographs



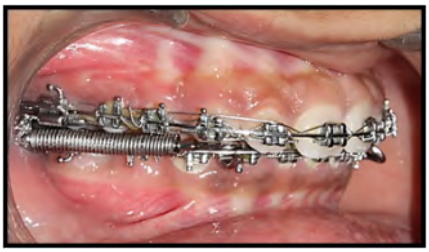
Pretreatment OPG

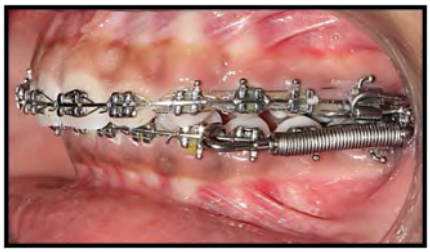


Pretreatment Lat Ceph

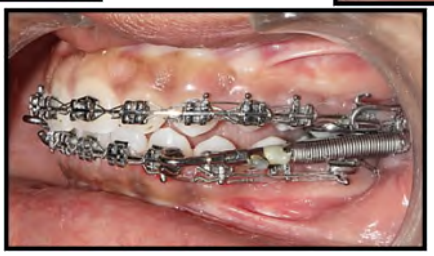
Utility Arch

Transpalatal Arch

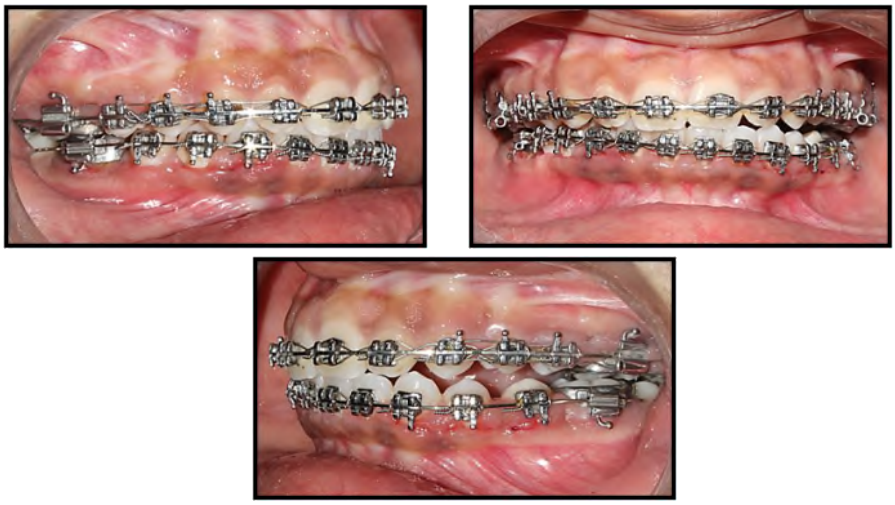




After giving fixed functional appliance (FFA, FORSUS)



Just before removal of FFA



Just after removal of FFA

TREATMENT SEQUENCE

Patient was planned to be treated with non-extraction method. Simultaneous protraction and intrusion of 11, 21 was done using Burstone utility arch, followed by dentoalveolar correction by using MBT prescription (0.022"x0.028" slot) in continuous arch mechanics. Transpalatal arch was given in the maxillary arch during this phase for anchorage control. Advancement of mandible was done by using fixed functional appliance (Forsus).

- Leveling and alignment were achieved using a standard archwire sequence (0.014" NiTi, 0.016"x0.022" NiTi, 0.019"x0.025"NiTi, 0.019"x0.025" SS).
- After leveling, Forsus FRD was attached to the mandibular archwire (0.019"x0.025" SS) distal to the canine and to the maxillary first molar tube.
- The Forsus was maintained for 6 months.
- Gradual correction of the molar relationship to Class I and improvement in mandibular projection were noted.

Final finishing and detailing were done with light interarch elastics for 3 months (4.5 oz, 3/16").

TREATMENT RESULTS

The post treatment facial photographs showed a remarkable improvement in patient profile and facial esthetics resulting from intrusion and proclination of the upper and lower incisors. Class I molar and canine relationship were established. Overjet and overbite relationship was improved to 2.5 mm and 3 mm respectively. Facial balance and smile esthetics were improved. Lip support improved for both upper and lower lip.

Retention Protocol: Fixed spiral retainer from 2nd premolar to 2nd premolar in both upper & lower arch.

Maxillary and Mandibular Skeletal Parameters

Parameter	Mean	Pre treatment	Present Treatment
SNA	82°	84°	82°
SNB	80°	74°	76°
AB Plane to NPog	0° to -9° (-4.6°)	-17°	-13°
ANB	02°	10°	6°
Wit`s Appraisal	-2mm to +2mm	+4mm	+2 mm
Pog –Na perp	Small -8 to -6mm Medium -4 to 0 mm Large -2 to +2 mm	-8.5 mm	-8 mm
Na perp to point A	0-1 mm	+2 mm	0 mm

Growth Pattern

Growth Pattern	Mean	Pre Treatment	Present Treatment
Y (growth) axis	53°-66° (59.4°)	61°	61°
F M A	16°-35° (25° norm)	26°	26°
MPA (Steiner`s)	32°	32°	32°
MPA (Down`s)	17° to 28° (21.9°)	26°	27°
L A F H	Small 60-62 mm Medium 65-67 mm Large 70-73 mm	48mm	50mm
JARABAK's ratio	62% to 65%	64.8%	63.90%
Facial Axis Angle	0 ± 3.5°	-4°	-4°

Soft Tissue Analysis

Parameter	Mean	Pre treatment	Present treatment
Nasolabial angle	102°±8°	100°	96°
Facial angle	90°-92° (91±7°)	88°	89°
H angle	10° (7°-15°)	23°	25°
Upper sulcus depth	5 mm	6 mm	7 mm
Lower sulcus depth	5 mm	6 mm	6 mm
Ricket's Lip analysis	Upper 4mm behind Lower 2 mm behind	-5 mm -1 mm	-1 mm 0 mm
Steiner`s Lip analysis	Lips behind – flat Lips anterior- protrusive	+4 mm +1 mm	+2 mm +1.5 mm
Z- angle	80°± 9°	65°	64°

Maxillary Incisor Position

Parameter	Mean	Pre treatment	Present Treatment
Upper CI to A-Pog	+5 to -1 mm(2.7 mm)	1.5 mm	+6 mm
Interincisal angle	130°-150°(134°)	160°	115°
Upper CI to NA (linear)	04mm	-5mm	+2.5 mm
Upper CI to NA (angular)	22°	11°	20°
Upper incisor Protrusion	4-6 mm	-4 mm	+3mm
Upper CI to SN	102°	74°	101°

Mandibular Incisor Position

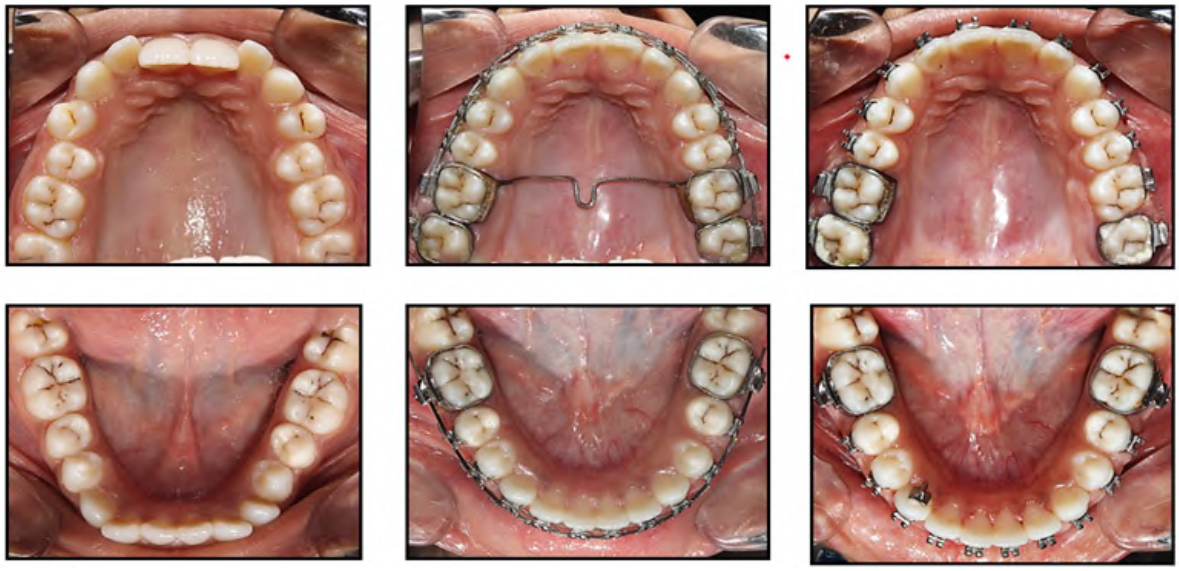
Parameter	Mean	Pre treatment	Present Treatment
Lower CI to NB (linear)	04mm	3.5 mm	8 mm
Lower CI to NB (angular)	25°	21°	46°
IMPA (Tweed)	76°-99° (90° norm)	92°	116°
Lower incisors Protrusion	1-3 mm	-3 mm	+3.5mm

DISCUSSION

Class II div 2 malocclusions combine both the characteristics of a class II molar relationship and a deep bite[1]. They have been found to be difficult to treat with a high risk of relapse as suggested by Canut and Arias 1999 due to strong muscular patterns[10]. However, there are several treatment options commonly employed. In this patient, intrusion and proclination of upper anteriors were done with utility arch. Studies have shown that unlocking the malocclusion helps in repositioning the mandible in a more forward direction thereby aiding in mandibular growth[3,4]. Likewise, the patient had a class II molar relationship at the start of the treatment and as the axial inclination of the upper anteriors was corrected, the mandible was repositioned forward, thereby translating the molar relation from class II to class I. Although there was no rationale to provide any evidence-based guidance for the treatment of Class II division 2 malocclusions, fixed functional appliances have been shown to be most effective treatment option[11]. The Forsus FRD was effective in this case as it delivered continuous force for mandibular advancement independent of patient cooperation. This case report demonstrated the effects of fixed functional appliance. The appliance produced significantly greater dentoalveolar changes with minimal skeletal change[5]. The patient was corrected

Extra Oral Pre Treatment

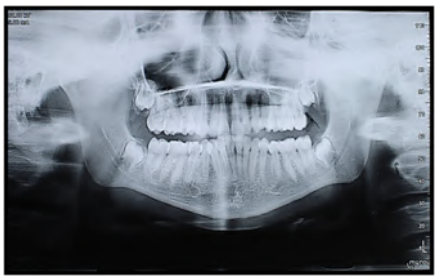
Extra Oral Present Treatment



PRE TREATMENT

MID TREATMENT

BEFORE DEBONDING



PRE TREATMENT RADIOGRAPHS **POST TREATMENT RADIOGRAPHS**

After Debonding and with retainer

to normal sagittal and vertical dental arch relationship. Proclination of lower incisors with fixed functional appliance reduces the lower lip overlap on the upper incisor, thus possibly creating favourable interincisal angle contributing to post treatment overbite stability[1,5,12].

Rickets four step superimposition showed that maxilla at point A moved distally by 2mm and the mandible was displaced along the facial axis which could signify either growth or relocation following unlocking of the malocclusion. The upper and lower incisors were proclined by 9° and 23° respectively. The overall superimposition of the profile (sella nasion line at sella) showed that the facial profile and lip support improved.

CONCLUSION

The fixed functional appliance (Forsus FRD) proved to be an efficient, compliance-free modality for treating Class II Division 2 malocclusion in a growing adolescent. It produced significant skeletal and dental corrections with marked improvement in facial esthetics and occlusion.

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