

A Case Report of Skeletal Class II Correction with Extraction and Fixed Functional Appliance

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ABSTRACT

Growing skeletal class II malocclusions with mandibular retrusion have been treated for more than a century with different types of removable and fixed functional appliances to advance the mandible. Fixed functional appliances have the advantage of not requiring patient compliance and can also be used concurrently with brackets. This case report documents the successful treatment of skeletal class II in late stages of puberty by decompensating the malocclusion with extraction of all first premolars and correction of skeletal discrepancy using Mandibular Protraction Appliance IV. The Mandibular Protraction Appliance IV (MPAIV) is a rigid fixed functional appliance that can effectively bring the mandible forward in a relatively shorter treatment time. It is compatible with complete fixed orthodontic appliances and can be incorporated into pre-existing appliances.

INTRODUCTION

Class II malocclusion presents a major and frequently observed challenge to orthodontists. Among different dental and skeletal combinations, that can create Class II malocclusion, mandibular retrusion is one of most common characteristics.¹ 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 malocclusion and the age at which it presents for treatment.² Numerous orthodontic techniques and appliances have been introduced to treat the same. Class II due to mandibular retrognathism in a growing patient can be managed by various removable and fixed functional appliances. Towards the deceleration phase of growth, fixed functional appliances like fixed twin block, Herbst, Jasper Jumper, Universal bite jumper, Mandibular Protraction Appliance, Eureka spring, Forsus FRD can be given.³⁻⁶

MPA IV: The latest version of Mandibular Protraction appliance, the MPA IV is much easier to construct and install, and much more comfortable for the patient. The MPA IV is made up of the following parts: “T” tube, Upper molar locking pin, Mandibular rod. The MPA IV can be activated on either or both sides simply by winding a section of nickel titanium coil spring over the mandibular rod. The amount of activation will be determined by the number of turns in the coil.⁷

CASE REPORT

A 14 year old circumpubertal male came with chief complaint of irregularly placed incisors with skeletal Class II jaw bases on account of retrognathic mandible with an underlying average growth pattern, Class II molar and canine relationship, overjet of 6.5 mm, overbite of 44 %, crowding i.r.t upper and lower anteriors, lower midline off to right by 2mm and protrusive upper and lower lips. (Figure 1)

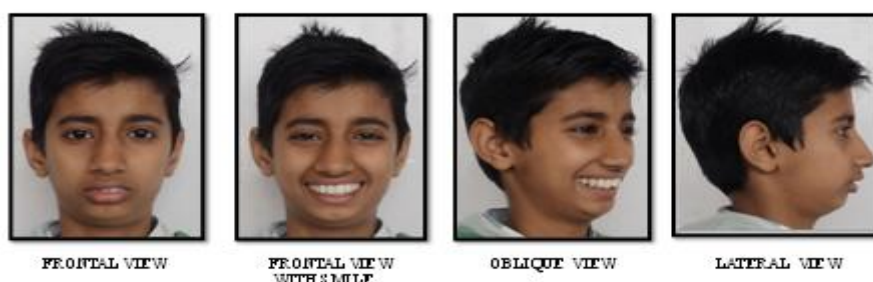




Fig. 1: Pretreatment Photographs

Pretreatment cephalometric values confirmed a class II skeletal relationship with a ANB of 8.5° and an average growth pattern with FMA of 23° , and SN-GoGn of 29° .

Treatment Plan: Considering the findings, Extraction of 1st premolars and fixed mechanotherapy using MBT 0.022 slot preadjusted edgewise was planned. After Space closure, Fixed functional appliance would be given to advance the mandible in Class I relationship. MPA4 was the good option, considering age, patient comfort, ease of installation and no need of patient compliance.

Treatment Progress: Alignment was carried out using extraction of 1st premolars to decompensate the incisor relationship. Wire size was progressively increased to 19×25 inches in both maxillary and mandibular arches [Figure 2]. The wires were cinched so that the forces from the MPA4 was transmitted to the entire arch as a unit to prevent the spaces from opening up. Cephalometric findings before installation of MPA 4 were ANB of 7° , FMA of 24° , and SN-GoGn of 27.5° . Upper incisor-to-NA was 21° , 4 mm; lower incisor to NB was 24° , 4 mm; and lower incisor-to-mandibular plane angle was 99° .

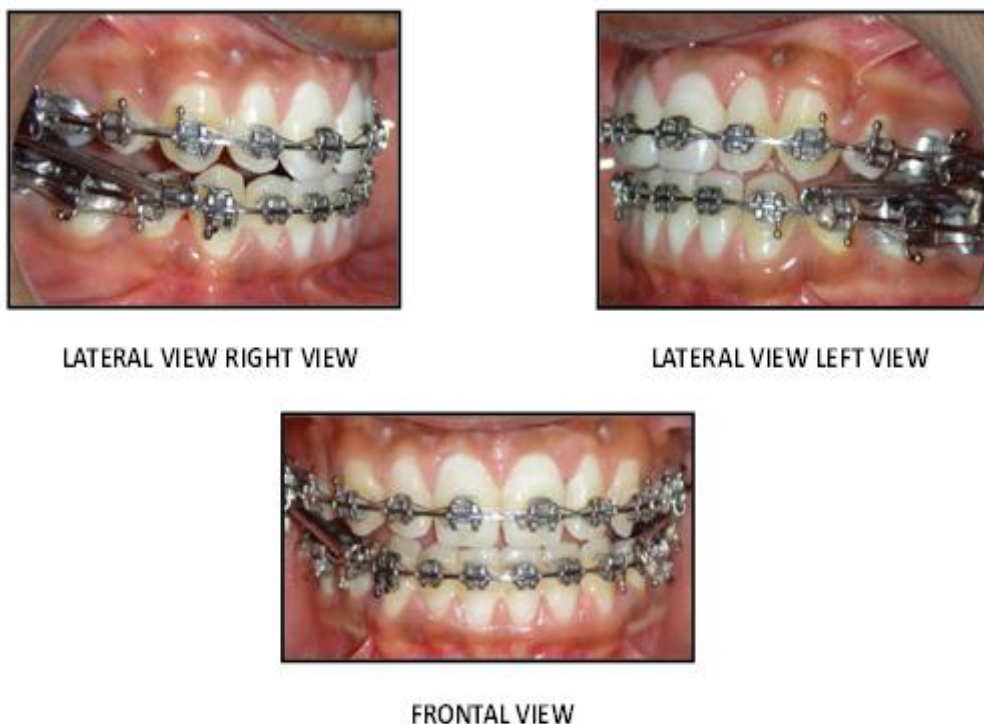


Fig. 2: Installation of MPAIV after SPACE Closure

After 5 months of continuous wear of the MPA4 [Figure 4], the molar and canine relationship was class I, and midlines were coinciding. The soft tissue profile improved from before. The cephalometric findings showed ANB of 5.5° , FMA of 24° , and SN-GoGn of 30° . Upper incisor-to-NA was 20° , 4 mm; lower incisor-to-NB was 26° , 4.5 mm; and lower incisor-to-mandibular plane angle was 103° . The Cephalometric findings before and after removal of MPA4 (Table 1) show that the molar relationship had corrected and the lower incisors were flared.

The chin-lip contour improved, with increased prominence of the chin and lip. The lower facial height remained constant. Five months after removal of MPA4, [Figure 3] the changes seen cephalometrically and clinically remained constant. Long-term studies need to be done to evaluate the stability of these results.

Table 1: Comparison of Cephalometric Findings

Parameters	Pretreatment	Mid Stage	Post-treatment
SNA (°)	82.5	82	81
SNB (°)	74	75	75.5
ANB (°)	8.5	7	5.5
1-NA (°)	29	21	20
1-NA (mm)	5	4	4
1-NB (°)	28	24	26
1-NB (mm)	5	4	4.5
1-1 (°)	116	129	126
1-SN (°)	112	99	97
GoGn-SN (°)	27	27.5	29
FMA (°)	23	24	26
IMPA (°)	106	99	103
FMIA (°)	51	57	51
Wits appraisal (mm)	7	6	4.5
Y-axis	61	61	62
Bjork sum	387	388	391
Jaraback's ratio	66.3	64.6	64.1
Gonial Angle	121	122	124

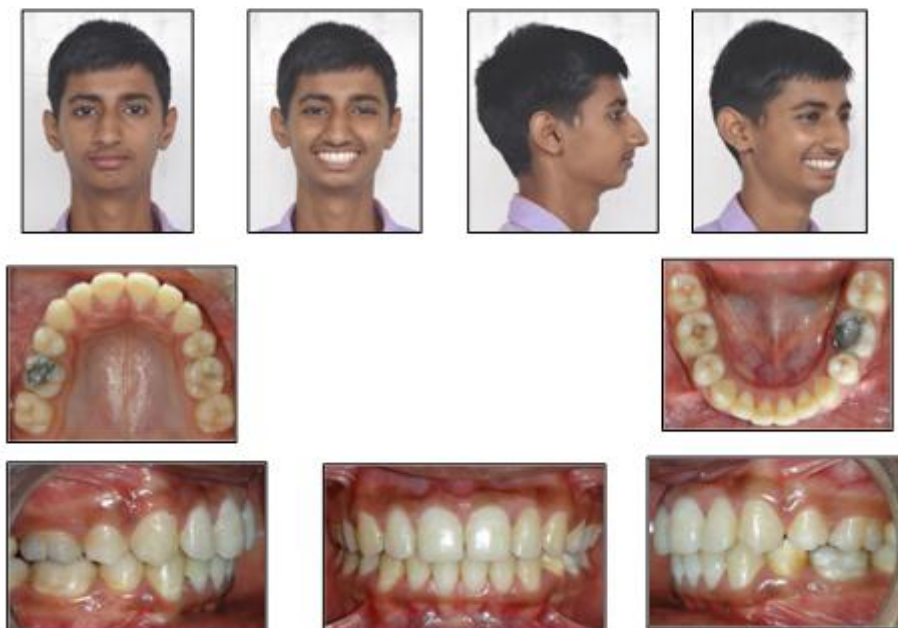
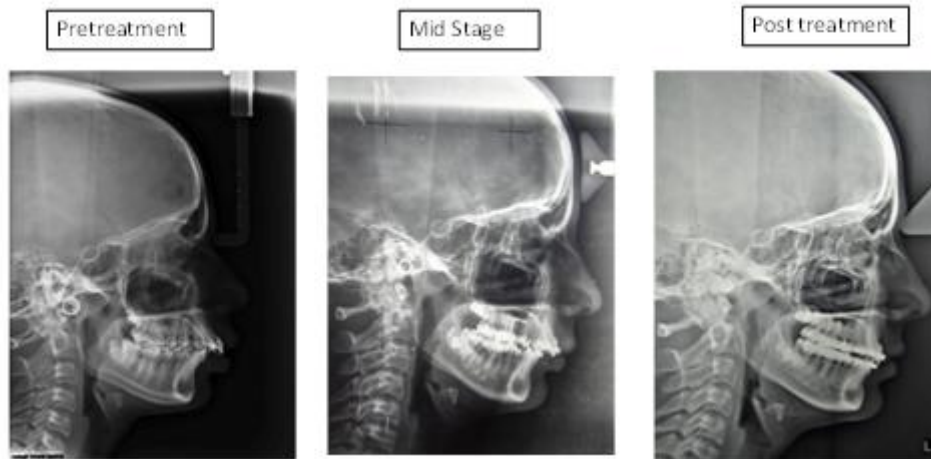


Fig. 3: Post-Debond Photographs



DISCUSSION

Treatment of class II malocclusion can be benefited by limiting the side effects, minimizing the need for patient compliance, and avoiding appliance breakage. MPA4 in our patient, who was in deceleration phase of growth, brought about primarily dentoalveolar changes. There was improvement in the soft tissue profile of the patient and the occlusion was perfected. At the end of treatment, good occlusion ensured the stability of the results.

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