

Early Intervention of Skeletal Class II Malocclusion by Twin Block Appliance Therapy

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ABSTRACT

This article presents two cases of adolescent male patients of skeletal class II malocclusion treated by Twin block appliance followed by fixed appliance therapy.

Twin block is a myofunctional appliance which was used for growth modification in both the patients for promoting mandibular growth. Fixed appliance therapy was followed then after to achieve dentoalvolar corrections and for final finishing and detailing. The treatment outcome in both the cases showed good skeletal, dental and soft tissue relationships. The patients had improved esthetics and self confidence.

Keywords: Myofunctional appliances, Profile, Growth pattern.

INTRODUCTION

The primary concern for seeking orthodontic treatment is the imbalance between sagittal relationship of the dentition and the jaws. The most commonly observed sagittal problems are skeletal class II maxillomandibular relationship¹ affecting about one-third of patients seeking orthodontic treatment.² McNamara³ reported mandibular retrusion to be the most common characteristic in a skeletal class II malocclusion. The final goal of any orthodontic treatment should be not only to obtain good function but also to improve facial attractiveness. However, achieving a harmonious soft tissue profile is sometimes difficult because a Class II malocclusion is one of the most challenging problems confronting the orthodontist.

Timing of orthodontic treatment, especially for children with developing Class II malocclusions, has always been controversial. Generally, treatment starts during the early mixed or late deciduous dentition and it is recommended that early treatment be started as early as possible for a more favourable result.

Twin Block appliance, which was originally developed by Clark, is a widely used functional appliance for the management of Class II malocclusion.⁴

Its popularity over other functional appliances is due to high patient adaptability and ability to produce rapid treatment changes.⁵

The present paper presents two case reports of adolescent patients treated by two phase therapy consisting of myofunctional therapy by twin block followed by fixed appliance therapy.

CASE 1

History

A 13 years old male presented with chief complaint of forwardly placed upper front teeth.

Assessment

Clinical examination of the patient revealed the following:

Extraoral

Frontal view of the patient showed symmetric face. Lateral view of the face showed convex profile, obtuse nasolabial angle (115°), competent lips with deep mento-labial sulcus and lip trap. Upper lip length was



Figure 1 Case 1 Pretreatment extraoral photographs

found to be short. Clinical FMA (Frankfurt Mandibular Plane Angle) was reduced representing horizontal growth pattern. (Fig. 1)

Intraoral

Patient was in permanent dentition stage with Class II molar relationship bilaterally and class II canines bilaterally as well. Incisor relationship was also class II with an increased overjet of 11 mm and increased overbite of 8mm (88 % of deep bite), upper anterior teeth were proclined with spacings in between, whereas

the lower anterior teeth were retroclined with mild crowding (Fig. 2).

Radiographic

The cephalometric analysis showed a skeletal Class II jaw relation. The patient had orthognathic maxilla (SNA 82°), retrognathic mandible (SNB 76°) and ANB of 6°. Beta angle was found to be 18°. Vertically, he presented a short face, that is a horizontal growth pattern (FMA 15°) and decreased lower anterior facial height (46 mm). Dental findings revealed proclined and forwardly positioned maxillary incisors and retroclined and repositioned lower incisors (IMPA 90°). (Fig. 3, Table 1).

The growth status of the patient was CVMI stage 3.

The OPG of the patient revealed mesially tipped maxillary central incisors and no other gross abnormality (Fig. 3).

Treatment Objectives

Our treatment aims were (1) to improve the facial profile, (2) to improve the skeletal jaw relationship as much as possible by redirecting the growth of the mandible toward downward and forward direction, (3) to accomplish desirable anterior occlusion for establishing functional occlusion, (4) to follow up



Figure 2 Case 1 Intraoral photographs



Figure 3 Case 1 Pretreatment lateral cephalogram and OPG

the remaining growth to assess the need for further treatment.

Treatment Plan

A Twin block appliance followed by fixed appliance therapy was chosen as a part of two phase treatment for the patient.

Twin block was selected for the purpose of orthopaedic correction to achieve harmonious maxilla-mandibular relationship.

Fixed appliance therapy was selected to correct dentoalveolar irregularities in the patient and for finishing and detailing.

Treatment Progress

Treatment was started with a twin block appliance with an expansion screw added to the appliance. Appliance was fitted and prescribed for fulltime wear (Fig. 4). First review of the patient was done after 10 days of appliance wear followed by monthly periodic review. Sagittal correction was achieved in five months time. Trimming of the appliance was continued periodically to allow eruption of posteriors and subsequent opening of bite.

Myofunctional therapy i.e. Phase I therapy continued for approximately 10 months after which phase II therapy with fixed appliance therapy was started. MBT prescription bracket system with slot size of 0.018 in × 0.025 in was used. In order to avoid relapse following orthopaedic correction with myofunctional appliance, an upper fixed anterior inclined plane was cemented in the patients mouth. The recommended sequence of

Table 1 CASE 1: Cephalometric variables before and after treatment

Parameters	Pre Treatment	Mid Stage	Present Stage
SNA	82°	83°	83°
SNB	77°	80°	80°
ANB	5°	3°	3°
N ⊥ to Point A	-1mm	+1mm	+0.5mm
Go-Gn to SN	24°	22°	26°
UI to NA (Angle)	41° (20)	29°	33° (19)
UI to NA (Linear)	7mm	4mm	3mm
LI to NB (Angle)	14° (27)	20°	20° (28)
LI to NB (Linear)	2mm	2mm	2mm
LI to Mand. Plane	90°	94°	96°

wires were used periodically for finishing and detailing of the occlusion (Fig. 5).

Results

After 18 months of complete therapy, skeletal, dentoalveolar and soft tissue corrections were achieved as expected. Post treatment results showed SNA of 83°, SNB angle changed to 80°, ANB reduced to 3° which was 6° prior to start of treatment. Mandibular plane angle (Go-Gn to Sn) increased from 24° to 26°. The inclination of upper and lower incisors improved. The soft tissue profile improved with upper and lower lips falling favourably on the S-line with an overall improvement in the esthetic appearance of the patient (Table 1, Figs 6 to 8).

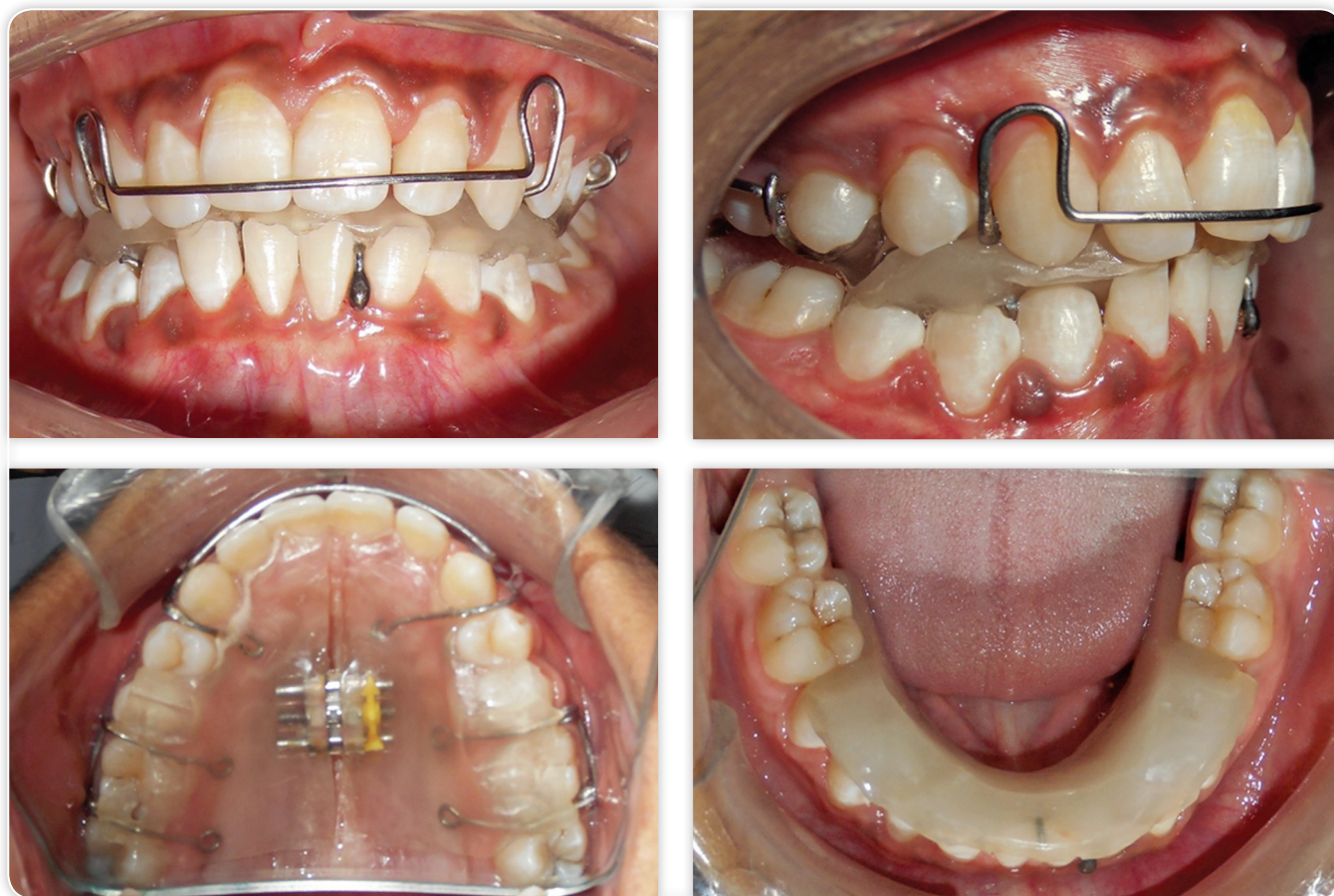


Figure 4 Case 1 Twin block with expansion screw inserted in patient mouth



Figure 5 Case 1 Fixed appliance therapy phase

CASE 2

A 12 years old male presented with chief complaint of forwardly placed upper front teeth. Upon clinical examination the patient presented convex profile, obtuse nasolabial angle, incompetent lips and deep mentolabial sulcus (Fig. 9). Intraorally the patient presented with clinically missing canine in first

quadrant, retained deciduous second molar in 2nd quadrant (65), crowding in maxillary anterior teeth region, proclined maxillary incisors, proclined mandibular incisors. Molars were in Angle's class II relationship bilaterally, canines were in class II relationship and there was an increased overjet and overbite (Fig. 10).



Figure 6 Case 2 Post-treatment intraoral photographs



Figure 7 Case 1 Post-treatment extraoral photographs



Figure 8 Case 1 Post-treatment lateral cephalogram and OPG



Figure 9 Case 2 Pretreatment extraoral photographs



Figure 10 Case 2 Pretreatment intraoral photographs

Cephalometric assessment revealed skeletal class II base, horizontal growth pattern, forwardly positioned and proclined maxillary incisors and proclined mandibular incisors (Fig. 11, Table 2).

The growth status of the patient was CVMI 3. OPG of the patient revealed unerupted maxillary canine (13), and unerupted maxillary second premolar (25) and retained deciduous tooth 65 (Fig. 11).



Figure 11 Case 2 Pretreatment lateral cephalogram and OPG

Table 2 CASE 2: Cephalometric variables before and after treatment

Parameters	Pre treatment	Present stage
SNA	81°	81°
SNB	75°	79°
ANB	6°	2°
N _⊥ to Point A	-1mm	+1mm
Go-Gn to SN	25°	27°
UI to NA (Angle)	24°	19°
UI to NA (Linear)	11mm	7mm
LI to NB (Angle)	36°	34°
LI to NB (Linear)	10mm	8mm
LI to Mand. Plane	114°	108°

Treatment Plan

A Twin block appliance followed by fixed appliance therapy was chosen as a part of two phase treatment for the patient.

Twin block was selected for the purpose of orthopaedic correction to achieve harmonious maxilla-mandibular relationship.

Fixed appliance therapy was selected to correct dentoalveolar irregularities in the patient and for finishing and detailing.

Treatment Progress

Treatment was started with a twin block appliance. Appliance was fitted and prescribed for fulltime wear. Periodic review and regular trimming of the twin block appliance was performed. Sagittal correction was

achieved in 7 months time during which 13 and 25 erupted and 65 shed off.

Myofunctional therapy i.e. Phase I therapy continued for approximately 12 months after which phase II therapy with fixed appliance therapy was started. MBT prescription bracket system with slot size of 0.018 in × 0.025 in was used. In order to avoid relapse following orthopaedic correction with myofunctional appliance, an upper fixed anterior inclined plane was cemented in the patients mouth. The recommended sequence of wires were used periodically for finishing and detailing of the occlusion (Fig. 12).

Results

After 24 months of complete therapy, skeletal, dentoalveolar and soft tissue corrections were achieved as expected. Post treatment results showed SNA of 81°, SNB angle changed to 79°, ANB reduced to 2° which was 6° prior to start of treatment. Mandibular plane angle (Go-Gn to Sn) increased from 25° to 27°. The inclination of upper and lower incisors improved. The soft tissue profile improved. overall improvement in the esthetic appearance of the patient (Table 2, Figs 13 to 15).

Discussion

Functional treatment of Class II malocclusion is best initiated during or before the pubertal growth spurt. Considering the occlusal development, this period correlates in most patients with the late mixed or early permanent dentition.⁶

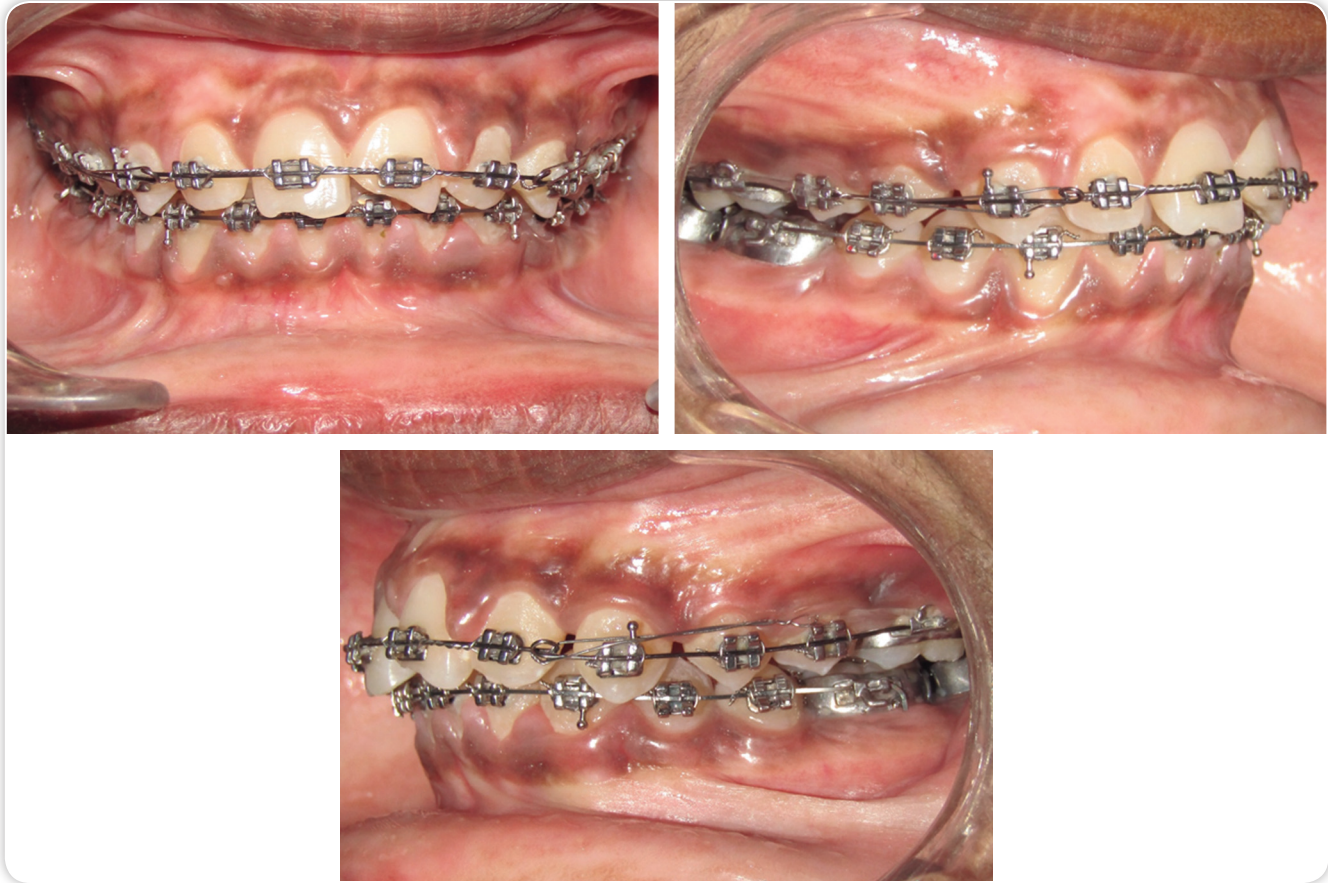


Figure 12 Case 2 Fixed appliance therapy phase



Figure 13 Case 2 Post-treatment lateral cephalogram and OPG



Figure 14 Case 2 Post treatment extraoral photograph



Figure 15 Case 2 Post-treatment intraoral photographs

Here, in this article, the patients were in growing stage and in the early permanent dentition and, thus, at an appropriate age to start with the functional appliance treatment.^{7,8}

According to Kevin O'Brien⁹ early orthodontic treatment with the Twin-block appliance followed by further treatment in adolescence at the appropriate time does not result in any meaningful long term differences when compared with 1 course of treatment started in the late mixed or early permanent. So it was planned to start treatment with Twin block appliance in both the cases. This was immediately followed by fixed appliance therapy to achieve dentoalveolar corrections.

Twin Block functional appliance has several well established advantages including the fact that it is well tolerated by patients,¹⁰ robust, easy to repair and it is suitable to use in the permanent and mixed dentition. The appliance effectively modifies occlusal inclined plane which induce favorably directed occlusal force by causing a mandibular displacement.^{4,11}

It has been proved in the literature that functional appliances do not produce long-term skeletal changes and most of their effects are dentoalveolar.¹²

In this article the cases treated by twin block appliance showed more of skeletal changes as compared to dentoalveolar changes but long-term follow-up has to be done. However finishing and detailing of dentoalveolar segments were well achieved by fixed appliance therapy.

CONCLUSION

The effect of Twin Block functional appliances is mostly skeletal as well as small dento- alveolar. There are a number of situations where functional appliances can be successfully used to correct class II malocclusion. It is important that functional appliances are used in a growing patient to achieve the maximum benefit. They simplify the following phase of fixed appliance therapy.

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