

Class II Correction using Combined Twin Block and Fixed Orthodontic Appliances: A Case Report

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Abstract

The following case report presents an effective orthodontic treatment for an eleven year old male who reported with mild Skeletal Class II jaw base, Class II division 1 incisors, with an increased overbite and overjet of 10mm along with mild crowding in upper and lower arches. A two phase treatment was planned. Phase 1 comprised growth modification with modified Clark's twin block appliance followed by Phase 2 of fixed orthodontic treatment with MBT appliance. A good static and functional occlusion was achieved with Class I molar relation on both sides along with improved facial profile.

Keywords: Modified Clark's twin block, Class II division 1, Mandibular retrusion, Functional appliance

INTRODUCTION

Class II malocclusion is the most commonly occurring orthodontic problem.¹ It is characterized by a dental antero-posterior discrepancy often combined with a skeletal problem which may be due to mandibular retrognathism, or maxillary protrusion or a combination of both. According to McNamara, retrusion of the mandible is the most commonly occurring factor contributing to Class II malocclusion.² Thus treatment approaches in such patients are aimed at altering the amount and direction of mandibular growth. Many functional appliances are available that help in mandibular growth by forward posturing of the mandible to correct the skeletal disharmony.

The twin block appliances are simple, comfortable and esthetically acceptable to the patient. It was developed by Dr. William Clark in 1977. The basic philosophy behind the twin block appliance are the occlusal inclined planes that act as a guiding mechanism causing the mandible to be displaced downward and forward. Twin blocks have the advantage of versatility of design.³ The design can be adapted to resolve different type of malocclusions in individuals.

CASE REPORT

An 11 year old medically fit Caucasian male reported with the chief complaint of stuck out upper front teeth and presented a Class II division 1 incisor relationship on a mild skeletal Class II jaw base with reduced vertical proportions, further complicated by overjet of 10mm, increased and incomplete overbite and mild crowding in upper and lower arches. The IOTN classification for the malocclusion was 5.a.

In clinical examination, extra oral assessment revealed that the patient had a mild skeletal II base due to retrognathic mandible with reduced Frankfort-mandibular planes angle and lower anterior face height.



Figure 1: Pre Treatment Extraoral Photographs

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Figure 2: Pre Treatment Intraoral Photographs

Soft tissue assessment revealed lip incompetency and lower lip trap with an incisal display of 3 mm at rest, an obtuse nasiolabial angle and deep labiomental fold (Figure 1). Intra-oral assessment revealed that the patient had mixed dentition with mild gingivitis, mild crowding in upper and lower arches, proclined upper incisors and retroclined lower incisors (Figure 2). The cephalometric analysis supported the clinical finding of mild skeletal class II pattern with proclined upper incisors and retroclined lower incisors.

Treatment Plan

The treatment was aimed at improving the facial profile by managing antero-posterior and vertical discrepancies and achieving Class I incisors, molar and canine relationship. A two phase orthodontic treatment was planned.

Phase 1 included growth modification using a modified Clark's twin block functional appliance. The upper appliance consisted of Adam's clasp (fabricated with 0.7mm SS wire) on first molars and premolars, upper labial bow (0.7mm SS wire) and posterior bite blocks with 70° inclination. The lower appliance included Adam's clasps on first molars and premolars (0.7mm SS), posterior bite blocks (70° inclination) and acrylic capping in the lower labial segment (Figure 3). The appliance was worn full time for 9 months followed by part time wear to allow settling of the occlusion (Figure 4).

Phase 2 comprised of fixed mechanotherapy with upper and lower Pre-adjusted Edgewise appliances (0.022" x



Figure 3: Phase 1 appliance therapy: Modified Clark's twin block appliance



Figure 4: Post functional Intra Oral Photographs

0.028" slot, with a MBT prescription) on a non-extraction basis (Figure 5).

Treatment Result

The results indicated improvement in both dental and skeletal parameters. At the end of the treatment, the overjet was reduced from 10 mm to 3 mm, overbite was improved and good Class I molar relation was achieved on both right



Figure 5: Phase 2 fixed appliance therapy



Figure 6: Post treatment Extraoral Photographs



Figure 7: Post treatment Intraoral Photographs

and left side (Figures 6 and 7). The ANB angle was reduced improving the patient's facial profile. Growth modification with use of functional appliance proclined the lower incisors by 2° to the mandibular plane. The upper incisors inclination reduced to 113° . The lower lip trap was eliminated due to favourable vertical and anteroposterior growth with the lips being competent at the end of treatment. Overall, a good static and functional occlusal result was achieved and no change in root length (Figures 7, 8 and 9).

DISCUSSION

A modified Clark's twin block appliance was chosen for growth modification which had Adam's clasp on both

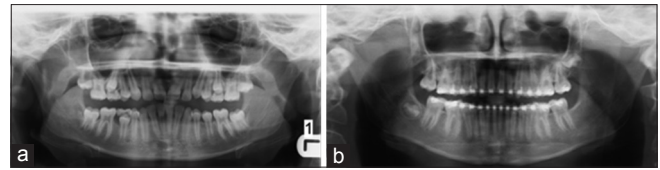


Figure 8: OPG. (a) Pre Treatment, (b) Near End

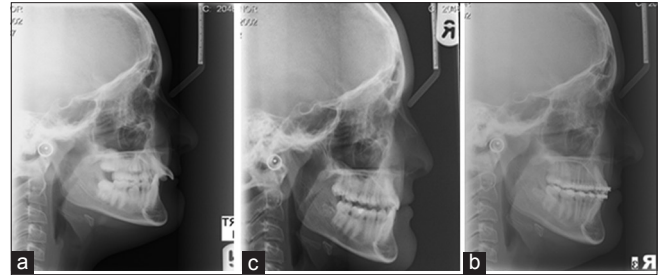


Figure 9: Lateral Cephalogram. (a) Pre Treatment, (b) Post Functional, (c) Near End



Figure 10: Retention: Upper and lower removable vacuum formed retainers to be worn full time for 6 months followed by 6 months of night time wear

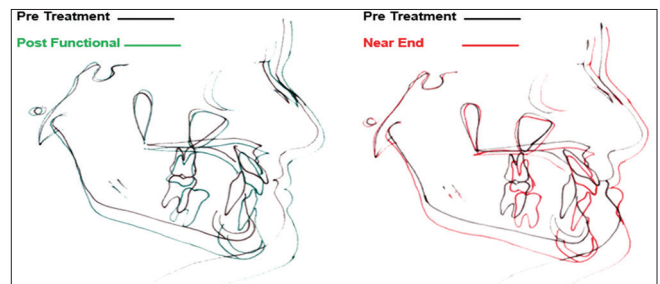


Figure 11: Cephalometric superimpositions. Overall superimposition, registered on De Costers line

upper and lower first premolars and first molars for better retention. A labial bow was placed on the upper incisors to correct the inclination of the upper incisors. It also aided the insertion of the appliance. Following antero-posterior correction, the appliance was worn on a night time basis to allow buccal settling and close of the lateral open bites.

Growth modification favoured the antero-posterior and vertical skeletal growth thereby improving the skeletal

Class II pattern, and providing dentoalveolar changes to correct the molar relation and reduce the overjet and overbite. A good aesthetic and occlusal result was achieved as reflected by the PAR score (Table 1).

The overall superimposition indicates a normal growth pattern of the craniofacial complex in a downward and forward direction (Figure 11). Cephalometric analysis revealed that sagittal correction was achieved due to an anterior repositioning of B point. Vertical skeletal growth continued throughout treatment which helped reduction in overbite.

The ANB was reduced by 1°, indicating favourable growth of mandible which resulted in reduction of the antero-posterior skeletal discrepancy. This was confirmed by the reduction in the wits analysis to 0mm. The upper

incisors were retroclined but the increased palatal root torque in MBT bracket (-17°) helps counteract post functional incisor retroclination. The lower incisors got slightly proclined but still within the normal value (Table 2).

Lund and Sandler⁴ in their study of 36 subjects treated with twin block appliance reported an increase in mandibular length, increase in SNB angle and decrease in ANB angle. The skeletal results were in agreement with another study done by Mills and McCulloch on 28 subjects treated by twin block appliance. However, Lund and Sandler reported a mean maxillary incisor retroclination of 11.0° as compared with 2.5° of retraction in the later study.⁵ This difference may be due to the use of labial bow in upper portion of the twin block appliance by Lund and Sandler. In this case, since an upper labial bow was used, there was a maxillary incisor retroclination of 12° and a lower incisor proclination of 6° as acrylic capping of the lower incisors was done. The Lund and Sandler group experienced slightly more proclination of lower incisors i.e. 8.2° as compared to 5.2° proclination in Mills and McCulloch group.^{4,5} This happened because in the later study an acrylic labial bow on lower incisors was used for retention purpose.

A long term retention using vacuum formed Essix retainers was given (Figure 10). The prognosis for stability is good provided that the patient complies with the retention regime.

Table 1: Occlusal indices

Index	Parameter	Value
Index of treatment need (IOTN)		
Dental health component	Start	5.a
	Finish	1
Aesthetic component	Start	10
	Finish	1
Peer assessment rating (PAR)		
	Start	17
	Finish	2
	Change	15
	% Change	88%

Table 2: Cephalometric values

Variable	Pre-treatment	Post-functional	Post-treatment	Change
SNA	80°	80°	80°	0°
SNB	77°	78°	78°	1°
ANB	3°	2°	2°	-1°
Eastman correction ANB	4°	3°	3°	-1°
SN to maxillary plane	7°	8°	8°	1°
Wits appraisal	3 mm	0 mm	0 mm	-3 mm
Upper incisor to maxillary plane angle	127°	113°	115°	-12°
Lower incisor to mandibular plane angle	82°	84°	88°	6°
Interincisal angle	133°	140°	136°	3°
MM angle	19°	23°	23°	4°
Upper anterior face height	45 mm	45 mm	47 mm	2 mm
Lower anterior face height	45 mm	50 mm	51 mm	6 mm
Face height ratio	50%	52%	53%	3.0 %
Edge centroid relationship	-2 mm	2 mm	2 mm	+4 mm
Lower incisor to APo line	-4 mm	-2 mm	-1 mm	3 mm
Lower lip to Ricketts E Plane	-6 mm	-4 mm	-3 mm	3 mm

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