



## CASE REPORT

# Biphasic Treatment of Class II division 1 Malocclusion Using Twin Block Appliance Coordinated with Fixed Orthodontics

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### Abstract

Early treatment of Class II division 1 malocclusion using functional appliance not only corrects the skeletal disproportion by altering growth pattern but also creates a significant improvement of the facial profile which enhances the patient's self-esteem. Moreover, functional appliance therapy enables treatment of such cases by non-extraction approach rather than by extractions. The aim of this paper was to present a case report describing the treatment of a young male patient with retruded mandible using a removable functional appliance called the 'Twin Block' for growth modification and correction of the increased overjet followed by pre-adjusted edgewise appliance. Successful results were obtained with improvement in facial profile and correction of Class II malocclusion.

**Keywords:** Angle's Class II malocclusion; Functional Orthodontic Appliances; Mandible; Retrognathia.

### Introduction

According to the British Standards Institute classification (1983), Class II division 1 incisor relationship malocclusion is defined as the lower incisor tip lying posterior to the cingulum plateau of the upper incisors with an increased overjet and/or either proclined or normally inclined upper incisors.<sup>1</sup> This presentation of malocclusion is often complicated due to a skeletal discrepancy involving the maxilla and mandible. It is the result of a retrusive mandible and/or a protrusive maxilla.<sup>2</sup> The most prevalent feature of this malocclusion is mandibular retrusion.<sup>3</sup>

Management of skeletal Class II cases depends on various factors including age, growth, compliance, and the severity of the malocclusion.<sup>4</sup>

Functional appliances hold the mandible open or open and forward. Pressure created by stretch of the muscle and the soft tissue are transmitted to dental

and skeletal structures, moving teeth, and modifying growth in preadolescents and adolescents.<sup>5</sup> Twin Block appliances have been used in clinical orthodontics since 1977, for treatment of Skeletal Class II malocclusions.<sup>6</sup>

Clark originally introduced the Twin Block appliance with 45° inclination on the blocks along with intermaxillary elastics and extra oral traction to enhance the inclined plane effects (1982, 1988).<sup>7,8</sup>

In 1989, Trenouth introduced the concept of forward reflex posturing using a 70° incline on the blocks to create an artificial forward bite of accommodation.<sup>9</sup> The intermaxillary elastics and extra oral traction were no longer required for the functional appliance to function efficiently even in the rest position, the mandible will maintain a forward position.

The modified Twin Block appliance is one of the most commonly used functional appliances due to its acceptability by the patient.<sup>10</sup> The functional

appliance has short term effects on both skeletal and dento-alveolar structures. But predominantly has dental effects like the retroclination biphasic treatment of Class II division 1 malocclusion using Twin Block appliance coordinated with fixed orthodontics of maxillary incisors and proclination of mandibular incisors which aid in correction of incisor relationship.<sup>6</sup>

The skeletal effects are acceleration of mandibular growth and restraining the maxillary growth. The acceleration of mandibular growth that is attained with functional appliances does not have the capability to increase the mandibular length beyond that which is so far genetically determined.<sup>11</sup> This functional appliance can be either removable or fixed.<sup>12</sup>

Success is determined by the patient's co-operation which can be quite demanding, the direction and extent of skeletal growth. Both of these variables are very difficult to predict.

The following case report describes a young growing male patient with class II division 1 incisor relationship on a Class II skeletal jaw bases with increased vertical proportions and increased overjet using modified Twin Block functional appliance.

### Case report

A healthy 13 years 5 months old male patient concerned about the "appearance of the crooked upper anterior teeth" presented with class II division 1 incisor relationship on a Class II skeletal jaw base with increased vertical proportions. The lower lip was trapped behind the upper labial segment, nasolabial angle was obtuse, with no facial asymmetry. This was complicated by V-shaped constricted maxilla, retained upper left deciduous canine, buccally erupted upper left permanent

canine, increased overjet of 10 mm, incomplete overbite, and mild crowding in the upper and lower arches. Lower centerline was shifted by 2.5 mm to the left side with bilateral buccal crossbite. The patient's dental and oral health was good. (Figure 1)

### Radiographic findings

Panoramic radiographs confirmed the presence of all permanent teeth including the developing third molars. In the cephalometric assessment (Table 1), SNA value of 83° and SNB value of 76° were at average value. The ANB value of 7° suggested a Class II skeletal pattern. The maxillary-mandibular plane angle was increased at 33° and the lower anterior face height ratio of 59.3% was above the normal range, all of which indicated increased vertical proportions. The upper incisors were proclined relative to the maxillary plane at 114°. The lower incisor inclination to the mandibular plane was decreased to 86° and the interincisal angle was normal at 132°. The lower lip was 1 mm behind Ricketts E-plane suggesting that the lower lips were relatively protrusive in relation to the nose and chin, the nasolabial angle was increased to 120°.

### Treatment Objectives

The aim of treatment of this clinical case included: to improve the oral hygiene, correct incisor relationship to Class I, obtain ideal overjet, overbite, establish optimal molar and canine relationship, expand the upper arch, relieve the upper and lower anterior crowding, to level and align the dental arches, correct the centerline discrepancy and to retain the corrected results.

### Treatment options

1. One-phase treatment: Employs fixed appliances with extraction of upper premolars and using class II inter-arch elastics to reduce the overjet with no effect on the retruded mandible.
2. Two-phase treatment: Employs a removable functional appliance for skeletal growth modification followed by fixed appliance treatment.

After a thorough analysis of pre-treatment diagnostic records, the following two phases of treatment was undertaken:

Phase 1: Modified Clark Twin Block functional appliance and sectional upper anterior edgewise fixed appliances (0.022"X0.028" slot) with McLughlin



**Figure 1: Pre-treatment extra oral and intra oral photographs.**

Bennett Trevisi System (MBT) prescription from 4-4 to align upper incisors.

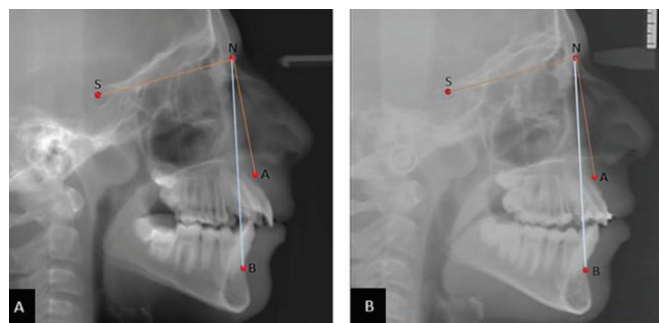
Modified Clark Twin Block functional appliance involved the following:

- Adams clasps on first molars in both arches (0.7mm stainless steel)
- Ball-end clasps on the mandibular incisors and first upper and lower premolars (0.7mm stainless steel)
- A midline screw
- Upper and lower with 70° incline acrylic blocks

The patient was instructed to wear the appliance for 24 hours and was advised to remove it during mealtime and cleaning. The patient was instructed to perform ¼ turn of mid-palatal expansion screw twice per week. The total active treatment duration was 8 months. The patient was informed to continue wearing the Twin Block thereafter at nighttime for 6 months to retain the changes along with selective trimming of upper acrylic inclined block to facilitate eruption of posterior teeth.

After the Twin Block phase, the posterior occlusion settled in its new position, the molars and canines were in Class I position (Figure 2) with only mild dental crowding.

**Phase 2:** Upper and lower pre-adjusted edgewise fixed appliances (0.022”X0.028” slot) with MBT prescription were bonded for resolving the residual crowding, improving the inter digitation of the teeth and ensuring a functionally acceptable occlusion. The total duration was 12 months.



**Figure 2: Pre-treatment lateral cephalometric images (A) after functional appliance post-treatment lateral cephalometric image (B)**

**Table 1: Pre-treatment (A) after functional appliance (B) post-treatment (C) difference between pretreatment and post-treatment (Dif. A/C)**

Measurements	Normal	A	B	C	Dif. A/C
SNA	82° ± 3	83°	83°	83°	0
SNB	79° ± 3	76°	78°	78°	+2
ANB	3° ± 1	7°	5°	5°	-2
SN to maxillary plane	8° ± 3	6°	5°	5°	-1
Wits appraisal	0 mm	-4mm	-1mm	-1mm	+3
Upper incisor to maxillary plane	108° ± 5	114°	108°	105°	-6
Lower incisor to mandibular plane	92° ± 5	86°	89°	91°	+3
Interincisal angle	133° ± 10	132°	125°	127°	-7
Maxillary mandibular planes angle	27° ± 5	33°	34°	34°	+1
Upper anterior face height	56.8 ± 3.7 mm	48 mm	48 mm	48 mm	0
Lower anterior face height	72 ± 5.6 mm	70 mm	72 mm	72 mm	+2
Face height ratio	55% ± 2%	59.3%	60%	60%	0.7%
Lower incisor to A-Point line	0-2 mm	-4mm	2mm	2 mm	+6
Lower lip to Ricketts E Plane	-2 mm	-1 mm	1 mm	0 mm	+2
Nasolabial angle	102° ± 8	120°	120°	120°	0

A point (A): the point of deepest concavity on the anterior profile of the maxilla

B point (B): the point of deepest concavity on the anterior surface of the mandibular symphysis

Sella (S), Nasion (N).

## Discussion

Treatment with functional appliances has demonstrated tremendous changes in the dental and skeletal relationships of a growing patient in a short period of time and has several well-established advantages in spite of some controversies and

debate. In this case functional appliance treatment reduced the overjet which in turn minimized the risk of trauma to the upper incisors.<sup>6</sup> It also established Class I canine and molar relationships, improved the patient's profile, which had a great influence on the patient's confidence and reduced the demand for