

# Effect of Early Intervention in Improvement of Skeletal Class II Malocclusion and Profile Change by Use of Functional Appliance: A Case Report.

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## Abstract:

Functional appliances have been used for a long time for the treatment of Class II patients. The main objective of therapy with functional appliances is to stimulate increased growth at the condylar cartilage which induces supplementary lengthening of the mandible. The most commonly used functional appliances is Twinblock appliance. A case report of mandibular deficiency treatment with Twin Block headgear combination was used for skeletal correction in a female patient whose sexual maturation and cervical vertebral maturation stage indicated the growth peak period. At the end of the treatment, profile of the patient improved, Class I molar relationship with normal overjet and overbite was achieved.

**Key words:** Twinblock headgear therapy, Skeletal Class II correction, Vertical maxillary excess correction.

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## INTRODUCTION

Functional appliances have been used for the treatment of Class II Division 1 malocclusion more than a hundred years<sup>1</sup> and over the past few years, there has been considerable debate on the merits of early orthodontic treatment for Class II Division 1 malocclusions.<sup>2</sup>

In orthodontic practice, Class II malocclusions are frequently observed. Droschl found it to be 37% among the children between 6 and 15 years of age. Mc Namara reported the most common characteristic of Class II malocclusion is mandibular retrusion.<sup>3</sup>

A wide range of functional/orthopedic appliances is available for the correction of Class II skeletal and occlusal disharmonies.<sup>4</sup>

A plethora of functional appliances such as the FR-2 of Fränkel,<sup>5</sup> bionator, the fixed and removable types of Herbst appliances<sup>6</sup> and the Jasper Jumper<sup>7</sup> have

gained widespread popularity for Class II correction in the last few years.

Functional appliance system that has been successful during the last two decades is the twin-block appliance. Twin-block appliance originally developed by William J. Clark of Fife, Scotland,<sup>8</sup> for use in the correction of Class II malocclusions which is characterized in part by mandibular skeletal retrusion.<sup>9</sup> The main objective of therapy with functional appliances such as the Twin-block is to induce supplementary lengthening of the mandible by stimulating increased growth at the condylar cartilage.<sup>10</sup>

The popularity of twin block is mainly attributed to its high patient adaptability and ability to produce rapid treatment changes.<sup>11</sup> A major advantage of twin-block appliance is its relatively smaller size

compared to other functional appliances. The appliance consists of maxillary and mandibular acrylic plates with bite blocks, which interlock at a 70° angle on closure while posturing the mandible forward.<sup>12</sup>

This case report demonstrates treatment of a patient with Class II Division I malocclusion using one-phase therapy. The treatment was accomplished with twin-block headgear combination.

### CASE REPORT:

#### Pretreatment assessment

##### History and clinical examination

A 11-year-old growing female patient reported with a chief complaint of forwardly placed upper front teeth. There was no relevant medical or dental history. Extraoral examination revealed convex facial profile with posterior divergence, no gross facial asymmetry. Soft-tissue examinations revealed incompetent lips, nasolabial angle was acute, deep mentolabial sulcus [Figure 1].

Intraoral examination revealed a permanent dentition except the third molars in all the four quadrant. Maxillary and mandibular arch was U shaped and constricted. Oral hygiene was good with no underlying gingival or periodontal disease; however, mild stains were present without calculus. The incisor relationship was Class II with 9 mm overjet and 7 mm overbite.

Buccal segment relationship was Class II molar relationship on left and right side respectively. Lower dental midline is shifted towards right side by 2 mm [Figure 2].

#### Diagnosis:

Diagnosis revealed skeletal Class II jaw base relation, with vertical growth pattern, dentoalveolar Angle's Class II div 1 subdivision malocclusion with spacing in the upper teeth and crowding in the lower teeth, proclined upper and lower incisors, constricted maxillary and mandibular arch with linguoversion lateral incisors in third and fourth quadrant with convex facial profile and incompetent lips.

#### Problem List

1. Skeletal Class II jaw base relation.
2. Class II molar and canine relation.
3. Increased overjet and overbite.
4. Spacing in the upper arch.
5. Crowding in the lower arch.
6. Linguoversion of 32 and 42.
7. Proclination of upper and lower anteriors.
8. Narrow upper and lower arches.
9. Deep curve of spee.
10. Convex facial profile.
11. Incompetent lips.

#### Aims and Objectives of Treatment

1. Achieving skeletal class I jaw base relation.
2. Achieving Class I molar and canine relationship.
3. Achieving normal overjet and overbite.
4. Alleviation of crowding.
5. To expand upper and lower arches.
6. To correct proclination.
7. Levelling of curve of spee.
8. Achieving harmonious, soft tissue profile.

#### Treatment alternatives

1. The first alternative was an orthosurgical management after the patient's growth was completed. This option had the disadvantage of patient waiting for a few years.
2. The second alternative was the extraction of maxillary first premolars and a camouflage treatment for Class II, Division 1 malocclusion. However, this treatment option would not improve the patient's facial frontal and profile features. It would also not inhibit the vertical growth of maxilla. This treatment alternative, therefore, was avoided.
3. To improve patients profile by controlling the vertical maxillary excess and backward rotation of the mandible, twin block headgear combination was opted as a next treatment option.



Figure 1: Pretreatment extra-oral photographs



Figure 2: Pretreatment intra-oral photographs

### Treatment progress

To improve the profile and control the backward rotation of the mandible, twinblock-headgear combination was used. Construction bite for the twinblock was taken with 3 mm of vertical opening and 7 mm of horizontal advancement. After 1 week of twinblock wear the headgear was attached to the twinblock tubes in premolar - molar region of the acrylic blocks [ Figure 3].

### Treatment results

The patient's profile had significantly improved, although there was gingival show on smile. There was a significant reduction in the soft tissue facial

convexity with downward and forward mandibular growth and a restraint of maxillary growth during. Class I dental occlusion was achieved bilaterally with optimal overjet and overbite [Figure 4]. The nasolabial angle was mildly acute at the end of treatment but showed a great improvement from its pretreatment value.

### DISCUSSION:

The nature of a Class II malocclusion is related to many factors, such as maxillary and mandibular growth patterns, facial structure and dentoalveolar development. Correction of mandibular deficiency in a skeletal Class II patient with a vertical growth pattern poses a great challenge.



Figure 3: Twinblock- Headgear combination



Figure 4: Post treatment photographs

The control of vertical dimension becomes very important as the facial convexity is exaggerated by downward and backward rotation of mandible. It appears that the control of vertical dimension is imperative for an optimal forward displacement of the correction of a skeletal Class II malocclusion.

Twinblock appliance is one of the most widely used functional appliances for the sagittal advancement of the mandible with vertical control. This produces a more favorable muscle pattern and also a change in bony structures as muscles adapt to new functional stresses. The effects of functional appliances in a skeletal Class II malocclusion includes reduction of ANB angle, restriction of maxillary growth, advancement of mandible, increase in lower facial height, correction of overjet, improvement in overbite, uprighting of the maxillary incisors, protrusion of mandibular incisors, correction of dental Class II malocclusion, correction of facial convexity, and reduction of mentolabial fold.

Our patient had skeletal Class II pattern along with vertical growth pattern. As she was in growing stage, our objective was functional advancement of the mandible and inhibition of further maxillary growth. The best treatment plan for the patient would have been an orthosurgical management, but as the patient was not interested in surgery and moreover, her growth was yet to be completed, twinblock treatment option was presented to her. The patient wore the appliance regularly. The skeletal correction was achieved by mandibular base lengthening and restriction of increase in maxillary basal length. The profile of the patient was improved drastically as seen from the post myofunctional therapy photographs and the cephalometric readings. There was a great amount of improvement in the nasolabial angle. A consonant smile was obtained at the end of treatment. Class I dental occlusion was achieved bilaterally with optimal overjet and overbite.

### CONCLUSION:

This case report elaborated on the use of twinblock-headgear combination for the correction of a severe skeletal Class II malocclusion. The result obtained was a marked improvement in the facial features and the correction of dental disharmony. Thus, by using

twinblock- headgear combination, the results were obtained which helped the patient gain pleasing profile and better esthetic results.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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