

Class II Malocclusion Correction Using *Twin Block* Appliance: A Literature Review

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Abstract

Class II malocclusion is one of the most common orthodontic problems and occurs in almost one third of the population. Its characteristics are in the form of retrognathic mandible and large overjet, resulting in an imbalance in the soft tissue profile. Treatment that can be done depends on various factors that influence the condition of the malocclusion, one of which is to consider the age status of the patient's growth. Twin block appliance is one of the most common types of functional appliance used in class II malocclusion cases because of its ability to produce rapid changes.. The study aimed to review the role of twin block appliance as a type of functional appliance that can be a treatment option for correcting Class II malocclusions. Scientific evidence and clinical cases are drawn from the literature to support this review and information about the role of twin block appliance in correcting class II malocclusion. The effectiveness of treatment results in the use of twin blocks in correcting Class II malocclusion must be supported by patient compliance in their use.

Keywords: *Class II malocclusion, Mandibular retrognathia, Functional Appliance, Twin Block Appliance*

1. Introduction

Class II malocclusion is one of the most common orthodontic problems and occurs in almost one third of the population.¹ In a local study conducted by Gul-e-Erum and Fida in Khoja, et al² mentioned that 70.5% of orthodontic patients with Angle Class II malocclusion conditions and among them 64.7% have Class II, Division 1 malocclusions. On a global scale, estimates show more than 20% prevalence of class II malocclusions in North America, Europe and North Africa.²

This malocclusion can be caused by many contributing factors, both in terms of dental and skeletal.¹ Characteristics are retrognathic mandibles and large overjets causing an imbalance in the soft tissue profile. Treatment that can be done depends on various factors that influence the condition of the malocclusion, one of which is to consider the age status of the patient's growth. In patients who are still in the growth stage, growth modulation therapy is a treatment option that can be done to correct this malocclusion.^{3,4}

Functional appliance is an orthodontic tool used to correct abnormal functions that are responsible for abnormal growth and development of the underlying hard tissue during growth. In the case of retrognathic mandible, this tool aims to position the mandible forward by stimulating its growth.⁵ Various types of functional appliance have been developed over the years to achieve the goal of treating Class II malocclusion.³

Twin block appliance is one of the most common types of functional appliance used in class II malocclusion cases and has been shown to provide good results in treatment.^{3,5} This tool has more popularity compared to other functional appliance because of its high patient adaptability and the ability to produce change quickly.⁵

The main objective of twin block appliance is to modify or direct the growth of mandible resulting in an improvement in skeletal discrepancy. The efficiency of treatment in this retrognathic mandible is highly dependent on the biological response of condylar cartilage. Therefore, progress towards the results of this treatment is very dependent on the duration of use, direction, amount, and type of strength used.⁶

2. Discussion

In September 7 1977, DR Williams J Clark developed the twin block tool most used at United Kingdom.^{7,8} *Twin block appliance* is the simple *bite blocks* that is effective modifying occlusal inclined plane used to patients who are still in the phase of development with retrognathic mandible to reposition the mandible in a forward (normal) position.^{1,9} The main goal of this therapy is to induce mandibular elongation by stimulating increased growth in the condylar cartilage bone.¹⁰ This tool utilizes the power of the surrounding neuromuscular to bring orthopedic and orthodontic changes thus it causes the displacement of the mandible.⁹

This tool can produce rapid functional correction of malocclusion by transmitting occlusal forces in the occlusal inclined plane that covers the posterior teeth and guides the mandible toward the front thus the correct occlusion is obtained. Thus, malocclusion can be corrected and the mandible is removed from the distal functional position which is locked.¹

2.1 Work Principle of *Twin Block Appliance*

The working principle of the twin block appliance basically lies in the occlusal inclined plane which is a fundamental functional mechanism for natural tooth growth. If the mandible inclined planes have a distal relationship with the maxilla, the force acting on the teeth in the mandible will have a distal force vector that tends to lead to the formation of class II malocclusions.^{3,8}

The purpose of the inclined plane in the bite block in the twin block appliance is to make modifications to the inclined plane that is expected to create a more profitable growth pattern. Therefore the unfavorable contact of cuspal from distal occlusion was replaced by favorable proprioceptive contact in the inclined plane to correct

malocclusion.^{3,8} Inclined planes in the bite block for the maxilla and mandible will basically lock together at an angle of 70 degrees. Thus, this condition allows the mandible to be directed to a more protrusive position. Repositioning the mandible forward will eliminate overjet and, when acrylic is removed from the upper block, an eruption of the lower first molar can occur thereby eliminating overbite.¹¹

This tool can be used for 24 hours, so that the strength of mastication can be transmitted through the tool to the teeth and then to the trabecular bone, consequently affecting the growth rate and supporting structure of the trabecular bone.^{3,8} Bearing in mind these principles, Clarks set a standard against twin blocks appliance with several components, including; (1) occlusal bite block meeting at an angle of 70 °; (2) Delta clasp of the upper molar and premolar teeth; (3) Ball end of lower incisors; (4) Labial bow to retract upper incisors; (5) base plate for the maxilla and mandible.³

2.2 Indications and Contraindications on the Use of Twin Block Appliance

Ideal indication on the use of this device includes; (1) class II division 1 and division 2; (2) class I open bite/ crossbite; (3) class III; (4) Lateral arch narrowing; (5) Discrepancy in length of the anterior / posterior; (6) TMJ dysfunction; (7) patients with overjet 10-12 mm accompanied with deep bite; (8) patients must be active and must be in active puberty.^{8,11}

The contraindications to the use of twin block appliance are; (1) Patients show allergic / hypersensitivity to methyl-methacrylate resins; (2) Patients with hyper-divergent growth patterns; (3) Patients with epilepsy and macroglossia.¹²

2.3 Treatment Stages

1) Active Phase

In the active phase, treatment can be started by asking the patient to use the device for several hours / day and then increasing the duration of usage for one full day in two weeks. This will later make it easier for patients to adapt to the tool, especially when using speech and during the mastication process.⁷

Then, the patient was reviewed again after six weeks of use to monitor oral hygiene and adequate retention. In addition, another important thing is that dentists do checks for overjet and molar relationships at each visit.⁷

Then, continued use in full for 6 months, followed by removing the inter occlusal bite plane and removing the clasp of the first molar.^{5,7} This is done with the aim of allowing eruption of the lower molars, or asking the patient to wear the device for only 12 hours per day.^{7,11}

The success of this treatment depends very much on the patient's good adherence to use the device all night and most of the day.¹³ Thus, it can be expected to reduce overjet by about 1 mm per month. The time taken during the active period of treatment is generally around 9-12 months when the incisors are in an edge to edge relationship and the molar is in a class III relationship.^{5,7}

2) Retention Phase

Functional retention is recommended after the use of functional appliance in the form of twin block appliance.¹⁴ Although very little research has been done to identify ideal retention after functional tool treatment, some doctors recommend the use of a simple retainer in the form of an anterior inclined plane that can be used to support the

relationship between incisors and corrected molar teeth while premolars and canines are expected to erupt and occlude well on the arch jaw.^{7,14,15}

This retention is used continuously until occlusion in the buccal segment is reached and can then be continued as a retainer at night.¹⁴ In addition, it can also use standard functional appliance with reduced bite blocks and used only at night.⁷ This stage generally requires time for 4-6 months.¹⁵

3) Permanent Orthodontic Care Phase

After the active phase progresses, orthodontic treatment is still needed to complete the occlusion and skeletal repair that must be achieved and correction of the remaining dental discrepancies.^{7,15} However, before making a decision about the space requirements in a case, it is important to record the lateral cca cephalogram to check how much lower incisor proclination occurred during treatment with twin block appliance.⁷

This is important for making decisions about ideal extraction patterns, if indicated. Another thing about crowding severity, overjet size and depth of the spee curve. In cases that are treated non-extractively, it might be better to strengthen the anchorage by using a headger.⁷

2.4 Success of Twin Block Appliance Care

Twin block appliance offers great effectiveness for correcting Class II malocclusion in individuals in their infancy. This tool produces major changes in dentoalveolar with an emphasis on inclination of teeth along with significant skeletal changes in the mandible.⁵ Thus, it provides good treatment results especially in improving facial appearance which helps to improve the child's self-esteem.^{5,16}

This tool simplifies the treatment phase using fixed appliance by obtaining anchoring and achieving class I molar relationships.⁵ Research conducted by Saikoski, et al in Kalgotra, et al⁴ assessed the dentoskeletal effects of Class II malocclusion treatments conducted with twin block appliance. The results showed that this tool significantly influences the lengthening of the mandible (Co-Gn) and a significant increase in maxillamandibular relationships.⁴

3. Conclusion

Twin block appliance is one type of functional appliance that is effective in handling cases of class II malocclusion during growth. However, the success of this treatment is very dependent on the patient's good adherence to the use of the device.

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