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**EARLY TREATMENT OF CLASS II DIVISION 1 MALOCCLUSION USING TWIN  
 BLOCK APPLIANCES: A CASE REPORT**

**Renie Kumala Dewi<sup>1)</sup>, Seno Pradopo<sup>2)</sup>, Sindy Cornelia Nelwan<sup>2)</sup>**

<sup>1)</sup>Department of Pediatric Dentistry, Faculty of Dentistry, Lambung Mangkurat University, Banjarmasin, Indonesia.

<sup>2)</sup>Department of Pediatric Dentistry, Faculty of Dentistry, Universitas Airlangga, Surabaya, Indonesia

**Abstract**

**Background:** Malocclusion is dentofacial growth deviation from its normal size and shape, thus causing abnormal occlusion. One of its etiology is heredity. Removable twin block, a functional appliance that can be used in interceptive orthodontic treatment, can be used to treat Class II malocclusion with large overjet in children during skeletal growth and development. **Case:** An 11-year-old boy came to pediatric dental specialist clinic with Class II division 1 Angle malocclusion (SNA 82°; SNB 74°; ANB 8°, CVM CS 4, overjet 14 mm, overbite 7 mm, and convex profile). Removable twin block for Class II malocclusion was chosen as the therapy.

**Case management:** Removable twin block appliance with acrylic occlusal bite block was used on maxilla and mandible separately. An angle of 70° was made in the occlusal bite block, which was made based on the bite registration wax during centric occlusion. This device is used 24-hours a day. Monthly dental visit was done to reduce the maxillary and mandibular occlusal bite blocks. After 9 months, an overjet of 5 mm was obtained. Cephalometry calculations became SNA 82°; SNB 79°; ANB 3°. The patient was given further phase 2 treatment with fixed orthodontic appliance. **Conclusion:** With proper case selection and good patient cooperation, removable twin block appliance can correct skeletal malocclusion, improve facial profile, reduce overjet and overbite, and correct molar relations.

**Keywords:** Class II Skeletal Malocclusion, functional appliance, removable twin block.

**Correspondence:** Renie Kumala Dewi, Department of Pediatric Dentistry, Faculty of Dentistry, Lambung Mangkurat University, Jl. Veteran 128B Banjarmasin, Indonesia. ph. (0511) 3306671. [renie.dewi@ulm.ac.id](mailto:renie.dewi@ulm.ac.id).

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**INTRODUCTION**

Malocclusion can be defined as a discrepancy between teeth and jaw relation that deviates from normal condition. Malocclusion can occur due to abnormalities of the teeth (dental), jaw (skeletal), combination of teeth and jaw (dentoskeletal), or mastication muscles (muscular). Skeletal Class II malocclusion can be caused by 3 conditions of abnormal maxillary and mandibular relation, namely: prognathic maxilla with normal mandible, retrognathic mandible with normal maxilla, or both. Functional appliances are the most widely used in growing patients as an option to correct dentoalveolar and skeletal discrepancies so that normal skeletal growth and development can be achieved.<sup>1</sup>

Researchers in the field of orthodontics found that the prevalence of malocclusion in school-age Indonesian adolescents was as high as 90% in 1983 and 89% in 2006. The results of these studies showed that most of the growth-age children experienced malocclusion, so that efforts to lower the incidence of malocclusion are needed

to be made, for example, by doing early examination and preventing malocclusion.<sup>2,3</sup>

There are 3 treatments for skeletal Class II malocclusion: directing jaw bone growth (jaw orthopedic), dental camouflage, and orthognathic surgery. Class II skeletal malocclusion in still-growing children can be treated by jaw orthopedic therapy. The purpose of directing jaw growth is to correct maxilla and mandible relationship by utilizing facial growth in children.<sup>4,5</sup>

It is a major challenge to correct skeletal Class II malocclusion in patients of growing age with great result. The use of functional appliances in orthodontic treatment, such as twin block appliance which was introduced in 1977 by Dr. William Clark, demonstrated a significant improvement in treatment outcomes in patients with class II dentoskeletal malocclusion.<sup>6</sup>

Functional appliances are orthodontic devices that correct teeth and jawbone growth by using muscular pressure. There are several clinical indications for the use of functional appliances in treating Class II malocclusion. Besides, there are

various kinds of functional appliances that can be used to correct Class II malocclusion, such as activator, functional regulator, twin block, and others. According to Clark, twin block appliance is the most widely used among other kinds of functional appliances. Unlike other appliances, it can be adjusted quickly during speech and patients can immediately see changes when using it so that it can function as positive reinforcement. Twin block appliance is useful in cases in which both sagittal and vertical relations are abnormal. It is chosen as therapy due its design, which is simple, comfortable, and aesthetically pleasing that can be used all day long. Class II malocclusion with large overjet in still growing children can be done by using functional appliances as an orthodontic interceptive treatment, one of which is the removable twin block appliance.<sup>7,4,3</sup>

#### CASE

An 11-year-old boy and his parents came to the Pediatric Dental Specialist Clinic with chief complaint his teeth were too forward, thus they wanted to straighten his teeth. On extra-oral examination, his face was symmetrical with convex

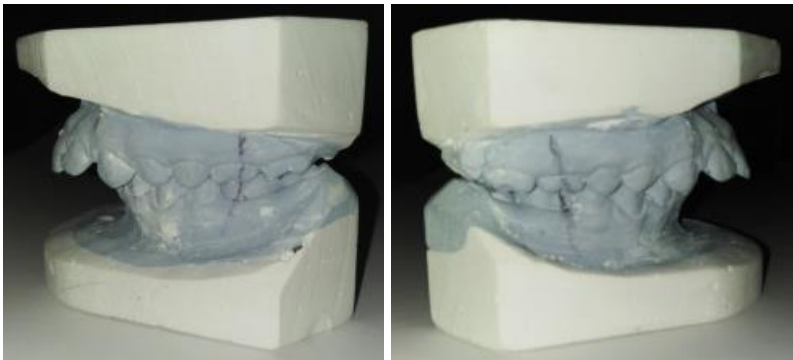
facial profile and incompetent lips (Figure 1). On intra-oral examination, there was gangrene radix on teeth 55 & 65, protrusion of anterior teeth (overjet 14 mm, overbite 7 mm), maxillary model discrepancy -9 mm, mandibular model discrepancy -3 mm, diastema on teeth 14-13-12-22-23-33-34-41-42-43-44, 1 mm median line shift to the left, Class II Angle permanent molar relation (Figure 2). The patient's oral hygiene was good and there was no gingivitis or periodontitis. He had normal labial, lingual and buccal frenulum, normal tongue, normal tonsils and high palate. On panoramic x-ray examination showed the permanent teeth were perfectly erupted. The lateral cephalometric analysis shows a normally positioned maxilla and mandibular retrusion (SNA 82°; SNB 74°; ANB 8°, CVM CS 4 (Figure 4)). Evaluation of patient's cervical radiograph indicated that he had considerable amount of growth remaining. Based on clinical and radiograph examination, the patient was diagnosed with Class II Angle Division 1 malocclusion. The patient was treated using removable twin block for Class II appliance.



**Figure 1.** Pre-treatment extraoral photographs



**Figure 2.** Pre-treatment intraoral photographs



**Figure 3.** Pre-treatment study model



**Figure 4.** Pre-treatment cephalometric radiograph.

### CASE MANAGEMENT

Before functional therapy with twin block appliance, the patient was implemented Dental Health Education (DHE), fissure sealant on teeth 16 and 26, and extraction on teeth 55 and 65 were done. Early treatment of Class II division 1 malocclusion was carried out using removable twin block Class II as an orthopedic therapy for 6-9 months. Bite registration was done with a forwardly placed mandible until Class I Angle molar relation was achieved with red wax, then the bite registration was inserted in the occludator model. A block made of red wax was made according to the

bite registration inserted which was occludator model, and inserted into the patient's mouth to see whether it adjustment was perfectly before acrylic removable twin block was made. The resulting blocks are 5-6 mm thick, so that the patient cannot retrude the mandible when in rest position. The blocks are separate block mandible and block maxilla. The block is made not too thick so that the patient can eat and speak comfortably with the appliance in the mouth. Mandibular block was made on the occlusal region of first and second premolars, while maxillary block was on ½ cups of second premolar and first molar.



**Figure 5.** Intraoral photographs with twin block appliance.

Both blocks had an occlusal inclination of 70°. For retention, Adam’s clasps (0.8 mm) were placed on all first molars, as well as labial arches on both maxillary and mandibular anterior. The steep inclined planes interlocked at about 70° to the occlusal plane.

- 7□ to the occlusal plane
- 7□ to the occlusal plane
- 7 to the occlusal plane

The twin block was instructed to be used for 24-hours per day for the first 7-10 days after insertion so that the patient could fully adapt to it. Besides, the patient was advised to had routine dental check up every 2 weeks (Figure 5. a,b). At each control, maxillary and mandibular bite block trimming as well as labial bow activation was

performed to correct multiple diastemas in the maxillary and mandibular anterior region.

After 9 months of twin block use, the molar relationship became Class I Angle with 5 mm overjet and 7 mm overbite (Fig. 5. c, d). Cephalometric analysis showed: SNA 82°; SNB 79°; ANB 3 °, which was Class I skeletal relation (Table 1 & Figure 6). There were visible changes in the face: profile balance or harmonization and the function of the craniofacial muscles was improved (Figure 7). To obtain perfect results, further treatment using fixed orthodontic appliances was performed after treatment with twin block appliance.

Parameter	Normal	Before	After
SNA	83.5 ± 2°	82°	82°
SNB	81 ± 2°	74°	79°
ANB	2.5 ± 2°	8°	3°
AM Line	2 ± 2 mm	7 mm	3°
BM Line	-1 ± 2mm	-2 mm	-2 mm
Wits	1 ± 2 mm	5 mm	3 mm
Go-Gn-Sn	32 ± 3°	35°	32°
FMA	26 ± 3°	33°	33°
I-SN	109 ± 6°	72°	104°
I-MP	96 ± 5°	115°	106°
II	125 ± 5°	99°	110°
Naso Labial Angle	93 ± 3°	90°	102°
Lower lip to E Line	1 ± 1 mm	9 mm	6 mm

**Tabel 1.** Cephalometric analysi



**Figure 6.** Post-treatment cephalometric radiograph.



**Figure 7.** Extraoral facial profile after twin block treatment



**Figure 8.** Post-treatment intraoral photographs.

## DISCUSSION

Based on Angle's classification, Class II malocclusion happens when the mandibular first molar is located distal to the maxillary molar at the time of occlusion. This condition is called as distocclusion. Angle further categorized Class II malocclusion into two divisions, namely division 1 and division 2. The etiology of skeletal Class II malocclusion in this patient is insufficient mandibular and normal maxillary growth.<sup>8</sup>

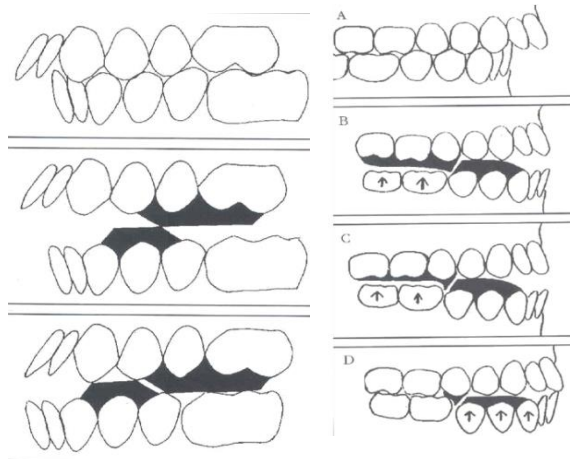
Twin block is one of functional appliances that is used to put the mandible forward so that it can align well with the maxilla. It allows additional mandibular length by stimulating the growth of the condylar cartilage and limiting the growth of the maxilla. Distraction of the mandibular condyle away from the glenoid fossa reduces pressure on the actively growing condylar cartilage. Changes in muscle tension of the condyle promotes more endochondral growth. Twin block consists of separate maxillary and mandibular acrylic devices with block on the occlusal segment of posterior

teeth. The block functions to position the lower jaw forward. Over time, the lower jaw will maintain in that position permanently.<sup>7,5</sup>

Twin block works based on the philosophy of occlusal inclined plane and daily masticatory forces. The purpose of the inclined plane is to modify mandibular growth pattern so that it can be more favorable (Fig. 8). Most twin blocks use inclined plane at the angle of 70° to the occlusal plane because it can maximize the horizontal force toward the mandible. As a result, the mandible is guided forward to an optimal position during occlusion. The main advantage of twin block is that it is esthetic and comfortable which allows the patient to wear it for 24 hours established about the changes at a faster rate.<sup>5,1,12</sup>

The use of using twin block appliance consisted of an active phase and a supporting phase. The active phase is aimed to correct the jaw relationship in the anteroposterior and vertical directions. The contact between the maxillary and mandibular bite blocks on the occlusal inclined

plane allows the mandible to move forward to provide more favorable relationship between maxilla and mandible. At each visit, an examination was carried out to determine the progress of the jaw relationship correction in the antero-posterior direction as well as reduction of overjet and overbite. By the time the active phase ended, the distal occlusion had been corrected to a Class I relation, where the maxilla and mandible were in ideal relation with normal overjet and overbite.<sup>1,9,11</sup>



**Figure 8.** Twin block lateral illustration.<sup>5</sup>

The duration of the active phase treatment was about 6-9 months, when correction of the distal occlusion, overjet and overbite had been achieved. Class II division 1 treatment using twin block appliance had both skeletal and dental effects. Skeletal changes were demonstrated as the facial profile improved. The reposition of retrognathic mandible could be assessed by the increase of the angle formed between the mandible and the cranial base in the antero-posterior direction (SNB). There was an increase in the lower anterior facial height due to the increase in vertical dimensions when the lower molars erupted.<sup>10,17</sup>

One of the advantages of using twin block appliance is that it is removable, easy to use and simple. With patient's good cooperation, this appliance allows effective progress of the treatment. Most patients will have better bite alignment and facial profile improvement after using twin block appliance.<sup>5</sup> With proper case selection and good patient cooperation, removable twin block appliance can correct skeletal malocclusion, improve facial profile, reduce overjet and overbite, and correct molar relations.

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