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# Insight into Twin Block - A Versatile Appliance

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## Abstract

**Introduction:** In orthodontics, several patients present with Class II malocclusions, which necessitates the implementation of Interceptive measures to mitigate the risk of development of severe complications. Functional appliances, specifically twin blocks, are pivotal for growth modification because they are adaptable in treating diverse malocclusions.[1] This review article aims to elucidate various modifications that can be implemented to tailor the appliance to the unique needs of individual patients.[2]

**Methodology:** This literature review aligned with the guidelines of the Pakistan Orthodontics Journal and involved a comprehensive literature search across databases such as Dentistry & Oral Sciences Source, MEDLINE, CINAHL Ultimate, and AMED. The investigation also involved a hand search of grey literature and national and international journals, with research data gathered from identified articles.

**Results:** Various design modifications of twin block identified by the existing literature included standard Clark's design[3]; evolved twin block; evolved clark's twin block with torquing spurs; modified twin block having the combination of high pull headgear and torquing spurs; modified twin block having southend clasp on mandibular central incisors; evolved clark's twin block having modified adam's clasp on maxillary and mandibular central incisors; evolved twin block with acrylic capping; evolved twin block for class II div 2 malocclusion; and Dr. Gerber's neuromuscular banded block design.

**Conclusion:** The modified designs of the clark's twin block device demonstrate enhanced efficacy in addressing various malocclusion issues, showcasing the appliance's versatility and potential for expedited treatment across different clinical scenarios.

**Keywords:** Functional orthodontic appliances, malocclusion, Angle class II

## Introduction

Most of the malocclusions need to be treated on an interceptive basis during the nascent stages of craniofacial development to prevent the progression of intricate dental and skeletal discrepancies and minimize the potential for more severe complications. Class II malocclusion is one of the most common malocclusions, necessitating targeted management using functional appliances. Etiology of class II malocclusion includes mandibular retrognathia, maxillary prognathisim or a combination of both, thereof, with the retrognathic mandible being the predominant factor. In growing individuals, functional appliances have been denoted to be effective in modulating the growth of the craniofacial region. These appliances produce skeletal and dental changes by harnessing forces from the neighbouring musculature.

Since its advent, the twin block has been the most popular and accepted among all

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functional appliances. It is a dental and soft tissue-borne appliance that connects these structures for producing optimal mucoskeletal forces. It is an appliance of choice for growth modification in orthodontics for several reasons. Firstly, it facilitates the achievement of rapid treatment outcomes. Secondly, its capacity to enable normal oral functions without hindrance contributes to its efficacy. Additionally, its high tolerability and amenability to prolonged wear enhance patient compliance as it can be comfortably worn for extended periods. Lastly, the appliance's versatility is underscored by its wide range of modifications, further tailoring its application to the needs of individual patients.

Most commonly, twin block is utilized to manage class II div 1 malocclusions; however, with some modifications, it can be used for diverse malocclusions. Accordingly, several modifications are incorporated in the standard appliance design to customize it for individual needs. The main objective of developing the twin block appliance was to induce substantive skeletal modifications rather than relying on less desirable dental changes. Notably, a discernible limitation arises in correcting overjet during treatment, primarily attributed to dentoalveolar alterations. Hence, several modifications have been instituted to achieve the desired skeletal changes.

This article aims to demonstrate various adjustments that can be embedded within the device framework of twin blocks to customize it to the specific needs of individual patients.

## Methodology

This research was conducted following the literature review guidelines by the Pakistan Orthodontics Journal. A literature search was conducted across databases, including Dentistry & Oral Sciences Source, MEDLINE, CINAHL Ultimate, and AMED to retrieve potentially relevant studies. These databases were accessed via EBSCOHost research platform. Search terms and medical subject headings used in the literature search included twin block, functional appliances, type II malocclusion, orthodontic appliance modification, treatment outcome, and malocclusion correction. Following electronic search, a hand search of grey literature and national and international journals was undertaken to identify relevant articles. Research data was gathered from each article separately. Exclusion criteria included articles that did not provide information regarding twin block modifications for managing malocclusions.

## Result

Electronic and hand searches of various data sources yielded 69 articles. Of these studies, 50 were found relevant to the current research topic. The remaining articles that did not meet the inclusion criteria were rejected. A qualitative synthesis of twin block modifications for correction of malocclusions is given.

## Discussion

### History of Twin Block

The twin block appliance, attributed to William J. Clark in 1977[3], originated from a clinical case involving incisor trauma. The impetus for its development arose from the management of an 8-year-old patient who had experienced a traumatic incident leading to the laxation of a maxillary incisor. In response, an upper inclined plane was implemented to secure the affected tooth from recurrent trauma inflicted by the mandibular dentition. Remarkably, the subsequent observation of a substantial reduction in the patient's overjet constituted the inaugural documentation of the clark's twin block appliance.

### Components of Twin Block

### Standard Clark'sTwin Block Appliance

The standard clark's twin block appliance, following the framework principles outlined by Clark,[3,4] encompasses several integral

components designed to address malocclusion effectively:

1. **Acrylic Plates:**
   Separate upper and lower acrylic plates are meticulously customized to optimize speech functionality and tolerability, ensuring patient comfort.
2. **Bite Blocks:**
   Both upper and lower plates feature occlusal blocks with a uniform height of 4-5 mm and an inclined plane angle of 45 degrees, strategically positioned to facilitate optimal therapeutic outcomes.
3. **Expansion Screw:**
   An expansion screw, integrated into the upper plate, serves the purpose of effecting maxillary expansion for the correction of the transverse dimension. The screw activation regimen entails a biweekly schedule.
4. **Adam Cribs or Delta Clasp:**
   Positioned on the first premolars and first molars, Adam's cribs or delta clasps contribute to the retention of the appliance.
5. **Ball End Clasp:**
   Ball end clasps, situated between the lateral incisor and canine on both upper and lower plates, enhance the stability and retention of the appliance.
6. **Rotational Springs:**
   Torquing spurs, strategically placed over the maxillary incisors, control tipping, thereby contributing to the precision of orthodontic outcomes.
7. **Modified Adam's Clasp:**
   Modified Adam's clasps are deployed over the incisors to augment anterior retention, ensuring the stability of the plates.[5]
8. **Flying Headgear Tubes:**
   Embedded in the upper acrylic plate at the first molar area, flying headgear tubes facilitate engagement with headgear, offering additional therapeutic benefits.

The twin block appliance, characterized by two customized bite blocks, affords full-time wearability approaching 24 hours, thereby expediting functional improvement of malocclusion. Although a study[6] claimed no difference between full time vs part time but the actual part time in study was not approaching 24hours.

This is achieved by transmitting forces through the dentition, providing a continual proprioceptive stimulus that imparts a discernible impact on growth and bone structure.

**Fig. I: Standard Twin Block framework**

**Modified Twin Block framework:**

Modified twin block design comprises the following components:

1. Upper acrylic plate with midline expansion screw
2. Upper and lower bite block height of 7mm
3. Bite blocks inclined plane angle of 70 degrees
4. Adam or delta clasps on bicuspids and molars for retention
5. Ball end clasps mesial to lower canine to improve the retention.
6. Torquing spurs in upper incisors region to counteract retroclination
7. Southend clasp on incisors to be for retention

**Fig. II: Modified Clark'sTwin Block**

**How to Manage Incisor Inclination in Class II Malocclusion by Clarks's Twin Block?**

**1. Modified Clark'sTwin Block with rotational Springs**

The incorporation of torquing spurs on maxillary incisors effectively controls torque loss. These wire spurs encircle incisor tips and extend to the labial surface. This modification has been said to cause a noteworthy statistical and clinical decrease in retroclination as opposed to appliances with labial bows. Additionally, there is a notable decrease in upper incisor tip extrusion. Torquing spurs offer precise torque control, enhancing orthodontic treatment outcomes.

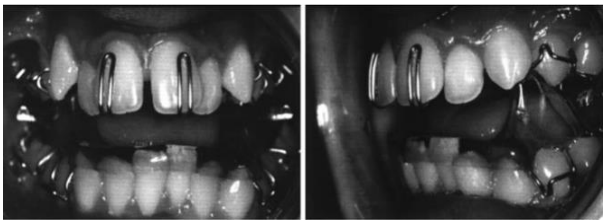

**Fig. III: Modified Twin Block with Torquing Spurs**

**2. Modified Clark'sTwin Block having Combination of occipital Pull Headgear and Rotational Springs:**

In cases where there is a need to control both the downward growth of Maxilla and the retroclination of maxillary incisors, numerous researchers have suggested using the combination of occipital-pull headgear and rotational spurs.[7,8]

The design of the maxillary appliance encompasses several key elements. These include an acrylic block plate featuring Adams cribs positioned on the first molars and bicuspids and rotational sprus on the central incisors. Additionally, a 70-degree steep inclined plane is incorporated with a midline expansion screw and flying headgear tubes situated at the level of the maxillary second premolar. Complementing this configuration is the utilization of a high pull headgear, exerting a force of 400gm/ side, to be worn for 14-16 hours per day.

**Fig. IV: Evolved clark's Twin Block with rotational Springs and Occipital Pull Headgear**

**3. Evolved Clark's Twin Block having modified adam's clasp on Mandibular Central Incisors**

The modified Adam's secures the teeth surface against the acrylic base plate, aiming to exert optimal control over the axial angulations of the incisors. This modification in the twin block framework is made to gain maximum skeletal correction by minimizing the amount of dental component.

**Fig. V: Modified clark's Twin Block with modified Adam's Clasp on Lower Central Incisors**

**4. Evolved Clark's Twin Block with modified Adam's clasp on Upper and Lower Central Incisors**

Usually, in class II division I malocclusion cases, overjet is corrected by retraction of maxillary dentoalveolar structures and advancement of the mandible. Twin block therapy offers both of these functionalities; however, emphasizing the maximization of mandibular advancement is deemed more advantageous than retroclination of maxillary incisors for addressing overjet issues. This can be attained by integrating control over the incisors by incorporating modified adam's clasps. [9]

In the context of twin block appliance therapy, using Southend clasps effectively reduces the degree of maxillary incisor retroclination by nearly half. An important finding was a reduction in lower incisors proclination in the presence of a modified adam's clasp. In this way, skeletal correction can be enhanced.

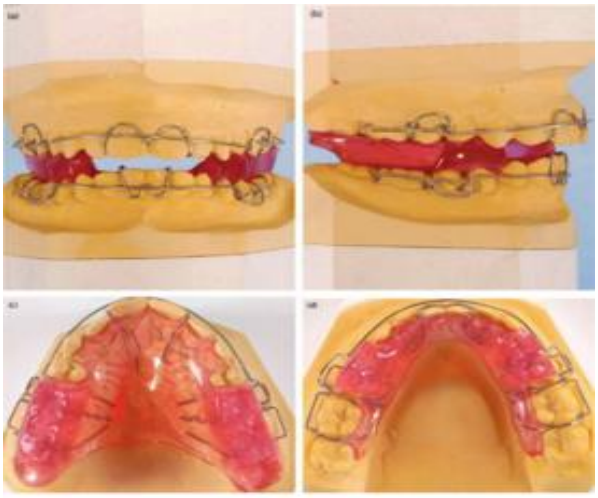

**Fig. VI: Evolved Clark's Twin Block with modified adam's clasp on Upper and Lower Central Incisors**

**5. Evolved clark's Twin Block with Acrylic Capping**

In the original design by Clark, an incisal coverage feature was integrated to forestall incisors labial inclination while twin block treatment. However, upon further investigation, it was noted that even without the capping, only a 5-degree labial inclination transpired during treatment. Furthermore, no proclination was observed at the later stages.[10] With acrylic capping, decalcifications at the tips of lower incisors were seen.

**6. Modified Twin Block for Class II Division 2**

For Class II Div 2 malocclusions, a modified twin block approach includes the integration of a double cantilever spring behind the upper anterior labial segment[11]. Subsequently, the upper labial segment is bonded with pre-adjusted edgewise fixed appliances. To enhance the corrective measures, an anterior screw with rotational springs is introduced, affixed upper central incisors. This combined strategy expedites treatment and eliminates the need for a pre-functional phase. Simultaneous enhancement of the upper labial segment and sagittal correction help prevent an increased overjet, reducing the likelyhood of injury from eminent maxillary incisors. Furthermore, it safeguards against potential issues arising from non-compliance with the functional phase after upper incisor labial inclination. The technique offers versatility, allowing for several inclusions to the upper clark's twin block, such as T or Z springs, to achieve the desired proclination of the upper incisors.

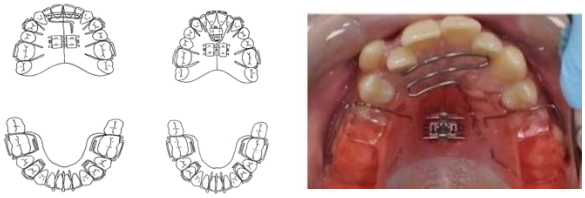

**Fig. VII: Evolved Clark's Twin Block for Class II Division 2**

**7. Fixed CBT – Dr. Gerber's Neuromuscular Banded Block Design**

Dr Gerber proposed a few design modifications to improve the twin block's stability. He proposed that a fixed full-

banded twin block can be made using a Wilson 3D-type appliance. Bands are placed on all the first permanent molars. This is useful in non-compliant patients as the bands are cemented. Furthermore, this design enhances patient comfort due to rounded acrylic edges. For lateral arch development, he proposed to add expansion screws, which are to be adjusted at the rate of 1/4th turn weekly. For vertical control, a facebow can be added as and when required.


**Fig. VIII: Banded Twin Block Design**

**8. Reverse Twin Block**

For Class III malocclusion a reverse bite CBT is advocated.[12]

**9. Designer Twin Blocks**

It is crucial to address the unique needs of each patient. Younger patients particularly enjoy participating in the selection of colours and designs for their orthodontic appliances. The design possibilities for these appliances are virtually limitless and depend on the designer's creativity. Orthodontic laboratories possess the expertise to fulfil the personalized requirements of each individual, catering to their preferences. This individualized approach increases compliance among younger patients, fostering a positive attitude toward the treatment protocol. The involvement of patients in the design process enhances their appreciation and enthusiasm for undergoing orthodontic treatment.

**Institution of Twin Block Therapy**

Commencement of twin block therapy typically coincides with the eruption of lower premolar teeth to a position conducive to adequate clasping. To mitigate the rebound risk, minimising the interval between functional appliance therapy and the initiation of full upper and lower fixed appliance treatment is essential. An optimal approach ensures a smooth transition from twin blocks to fixed appliances. Therefore, in most instances, initiating functional appliances should be deferred until the patient is within a 12-month of achieving a complete permanent dentition. [13]

**Case Selection for Twin Blocks**

**Suitable Cases:**

- **Adolescent Patients Requiring Sagittal Correction for Skeletal Class II:**

Twin blocks are particularly suitable for adolescents exhibiting Class II malocclusions with a skeletal component. This appliance is designed to address sagittal discrepancies, making it an effective choice for such cases.[14,15]

- **Timing Before Growth Spurt:**

Ideally, the initiation of twin block treatment is timed just before the patient's growth spurt. This ensures that the appliance capitalizes on the growth potential, facilitating optimal correction during adolescence.

- **Good Oral Hygiene:**

Patients selected for twin blocks should demonstrate good oral hygiene habits to minimize the potential of complications, such as dental decay or gum diseases.

- **Compliant Patients:**

Successful twin block therapy requires a high level of patient cooperation. Hence, patients who can wear the appliance consistently and follow treatment guidelines should be selected.

- **Motivated Patients and Parents:**

Treatment success is enhanced when the patient and their parents are motivated and committed to regular follow-up appointments and adhere to treatment recommendations.

**Unsuitable Cases:**

- **Absence of Growth Spur**

In the absence of some growth, dramatic change in the occlusion is unlikely to be gained, although dentoalveolar changes will still be found.[16]

- **Poor Oral Hygiene**

If oral hygiene is poor initially, the patient should be shown how to improve and informed that treatment will not start until a good level of hygiene is achieved and maintained on several follow-up appointments. A 10% plaque score is a reasonably objective measure of satisfactory tooth brushing. Patients are not placed on the waiting list, or treatment is suspended for those patients not achieving this level of cleanliness.

- **Unwilling to Wear Fixed Appliance**

Twin block appliance therapy typically yields a substantial improvement in occlusion; however, in most cases, attaining excellent results necessitates a subsequent course of fixed appliance treatment. When encountering patients who may not be amenable to the consistent use of fixed appliances, it is imperative to provide clear and comprehensive communication regarding potential compromises in the final treatment outcomes.

**Clinical steps for Twin Blocks**

**Proper impression:** all details of soft and hard tissues including last teeth should be recorded.

**Bite registration:** 7mm height at premolars region.[17]

**Protrusion:** 2/3rd of maximum protrusion. There is no difference between 1-step vs 2 - step advancement.[18]

## Conclusion

The article provides a comprehensive exploration of modifications in the framework of Clark's twin block appliance, emphasizing the customization options available to address the specific needs of individual patients. Over the years, its standard design, as outlined by Clark, has been effective in addressing malocclusion issues. The modified design of this appliance addresses specific concerns, such as incisor inclination in Class II malocclusion. The incorporation of torquing spurs on maxillary incisors is an effective means of controlling torque loss.[7]

The article explores combinations of modifications, such as integrating high-pull headgear with torquing spurs, emphasizing the need for a customized approach based on individual patient requirements. Adding modified adam's clasps on the lower central incisors and upper and lower central incisors is an effective method to enhance skeletal correction while minimizing the dentoalveolar component.

A modified twin block approach that includes a double cantilever spring and pre-adjusted edgewise fixed appliances is recommended for class II div 2 malocclusions. This approach aims to expedite treatment, prevent increased overjet, and eliminate the necessity for a pre-functional phase, showcasing the versatility of the clark's twin block appliance.

A cast twin block[19] in literature is also advocated ,also some suggest implant supported twin block[20] but in UK most popular appliance is clark twin block[21] with modifications showing different skeletal and dentoalveolar effects on different skeletal pattern but long terms dentoalvelar effects override the skeletal effects.[22,23]

## Ethical Approval

The study was approved by the Institutional Ethical Review committee of Islamabad Medical and Dental College, Islamabad (IMDC).

## Disclaimer

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## Conflict of Interest

It is declared that the authors don't have any conflict of interest.

## Authors' Contribution

**SS:** Data Collection, Write up

**SR:** Study Design and Methodology

**LK:** Data Analysis
**HSQ:** Supervisor, Review and Editing, Project Administration
**WU:** Supervisor, Validation and Proof Writing

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