

Modified Essix Twin Block Appliance: Successful Application in Adult Patient: A Case Report

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Abstract:

Twin-block appliance has proven its efficiency in adolescents. William Clark has given this appliance to non-growing patients also. Here we gave the appliance to a 20-year-old male. Appliance fabrication was done with a thermoformed sheet and acrylic. With this appliance, we achieved dento-alveolar and skeletal changes in a 20-year-old male patient. Generally, twin block has disadvantages like lower incisor proclination, poor periodontal health issues, and patient hesitance to wear the appliance. In this design, we have overcome the issues mentioned above. Soft tissue profile has also improved. Total treatment for appliance therapy was 8 months.

Keywords: Twin Block, Adult patient.

INTRODUCTION

Class II malocclusion comprises a broad array of specific skeletal, dental, and soft tissue features. It ranks second in distribution and prevalence among Angle's classification of malocclusion.¹ However, it is the most frequently encountered and treated malocclusion in orthodontic practice. The twin-block appliance, described by Clark in 1977, is currently the most popular functional appliance worldwide. Recent evidence suggests that it may also be considered the most successful in the treatment of Class II, division 1 malocclusion.

Significant proclination of lower incisors had been consistently reported as a major side effect of Twin-block appliances.² This complication, generally acknowledged for functional appliances, is attributed to a protrusive effect on the lower incisors exerted by the lingual appliance components while the mandible attempts to rebound to normal resting posture.³ Various designs and modifications of twin-block appliances have been used to decrease this side effect.⁴

With the following two points in consideration, namely, lower incisors proclination with a twin-block appliance which is not desired, and improvement of patients' acceptance of the appliance, numerous types

of modified Twin block appliance have appeared

Most functional appliances can only be reactivated by laboratory reconstruction or adjustments, or by time-consuming chairside additions of acrylic, with the accompanying risk of loose monomer in the intraoral cavity. Here we made a modified appliance with a thermoformed sheet and acrylic Resin. To eliminate the potential side effects (incisor proclination, and periodontal risks) of the twin block appliance treatment.⁵

Case report:

Diagnosis:

A 20-year-old male patient reported to the Department of Orthodontics with the chief complaint of forwardly placed teeth in the upper front region. Patient has Class II subdivision on skeletal class II base having horizontal growth pattern, proclined and bodily forwardly placed upper incisors with 12 mm of overjet and 100% or 8mm deep bite, congenitally missing mandibular central incisor, straight profile, obtuse nasolabial angle, and deep mento labial sulcus.



Pre-treatment intraoral and extraoral photographs



Pre-treatment lateral cephalogram

Appliance Design:

Bite Registration was made, and appliance was fabricated accordingly. First of all Essix retainer sheet was made from the 1mm thick aligner sheet then the model was mounted on a hinge articulator with a retainer

sheet and bite. Then bite was removed and blocks were constructed from the acrylic. Blocks were constructed at a 70° angle to each other. A 1mm wire was placed in a transverse direction for stability. Customized attachments were made inside the acrylic blocks for elastic engagement. For elastic engagement attachment, we used 0.7mm stainless steel wire.

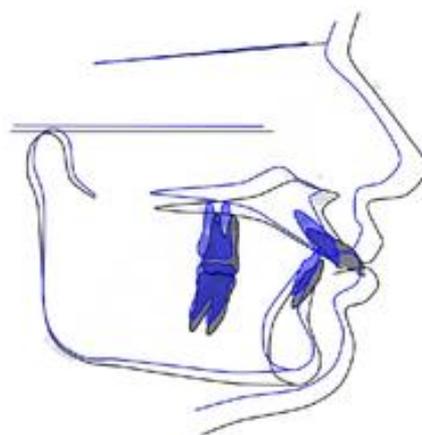


Appliance design

Variable	Pretreatment	After appliance
SNA	84°	84°
SNB	80°	82°
ANB	4°	2°
Wits appraisal	7 mm	4 mm
Upper incisor to NA (mm/deg)	52°/13 mm	37°/9 mm
Lower incisor to NB (mm/deg)	27°/3 mm	26°/5 mm
Upper incisor to SN plane	116°	100°
Lower incisor to mandibular plane(IMPA)	115°	115°
Inter incisal angle	96°	112°
Lower incisor to APo line	0 mm	+2mm
Overbite	6mm	4 mm
Overjet	13 mm	6mm
FMA	6°	5°
SN to mandibular plane	11°	12°
Jarabak ratio	87	63.4
Maxillary length—effective	89 mm	89 mm
Mandibular length—effective	86 mm	89 mm
Soft Tissues		
Lower lip to Ricketts E plane	0 mm	-2 mm
Nasolabial angle	75°	103°
Saddle angle (N-S-Ar)	125°	126°
Articular angle (S-Ar-Go)	142°	145°
Gonial angle (Ar-Go-Me)	103°	97°
Sum of posterior angles	371°	393°
Upper lip to E-line	-3 mm	-4 mm
Interlabial gap	3 mm	0 mm



Post treatment intraoral and extraoral photographs



Superimposition of pre-treatment and Post-Treatment cephalogram

After Myofunctional Appliance:

With this modified twin-block appliance we achieved skeletal as well as dentoalveolar changes. SNB angle was increased from 80° to 82°. We achieved skeletal class I based on ANB and Wits appraisal. There was

an increase in Mandibular length. As we can observe, we have achieved Class I canine and molar relation. overjet was reduced to 7mm, incisor relation to NA was 57° and 12 mm which was reduced to 37° and 9 mm. The articular angle also shows the forward positioning of the mandible which is evident on the lateral cephalogram. Soft tissue changes are seen in the cephalograph and facial profile. Superimposition shows the difference between the pre-appliance and post-appliance therapy. Superimposition shows changes in skeletal pattern, Reduction in overjet and overbite, advancement in mandible, and increase in mandibular length after giving the appliance.

Discussion:

Here we have presented a case where we have fabricated the modified version of the twin block appliance and treated the patient with the same. Twin block was fabricated on the 1mm thermoformed sheet, and the concept behind this, was the augmentation of anchorage when using intermaxillary traction. It is preferred in this type of case where the periodontal health of the patient is poor. In conventional removable twin blocks, retentive components are made of wire which requires skill of the clinician and they are more prone to breakage as time passes. Here we have eliminated this drawback of the breakage. In conventional design, if clasps are not made properly they will injure the soft tissue while in the appliance presented here soft tissue injury is not seen. So, we considered these limitations and thought of the concept of treating adult patients with modified twin-block appliances. Surprisingly, there were skeletal changes along with dentoalveolar changes in adult patients. As we all know in conventional Twin block, there is undesirable labial tipping of mandibular incisors, and it can cause periodontal consequences. Furthermore, the inherently thinner layer of bony support around mandibular incisors is more liable to sustain iatrogenic damage. The alveolar bone in the mandibular anterior region is crucial to the stability of incisors, periodontal health, and acceptable aesthetics, and therefore, we considered this limitation and came up with the idea of this modification in which Thermoformed helps in the Augmentation of anchorage which helps in reducing the limitations of conventional Twin block¹⁻².

Peter et al described a case in an 11-year-old pre-pubertal female patient having class II division I malocclusion on skeletal Class II base with 8mm of overjet and 60% overjet treated with traditional twin block appliance. At the end of the myofunctional appliance phase, they achieved Skeletal classI relation and classI molar relation. Overjet was reduced to 2.5mm and overbite to 4mm. Upper incisor inclination was not reduced and there was increase in lower incisor proclination.¹

Golfeshan et al compared the two different types of twin-block Appliances.

Both classic and clear twin-block groups showed mandibular advancement without statistically significant differences between them. However, the SNB angle increased slightly more in a clear group than the classic one.” Headgear effect” was not statistically noticeable in both groups. However, the SNA angle decreased slightly more in the Classic group. An increase in lower incisors proclination was happening in both groups, but in the clear group, this increase was significantly less. Overbite reduction could be seen in both groups with significantly more reduction in the classic group.²

Tooth movements are slower in older patients, and the skeletal response diminishes as patients age increases. Adults respond with limited skeletal adaptation. This still leaves scope for significant facial changes especially when skeletal discrepancy is not severe. William Clark described a case of a 42year old patient with compromised periodontal condition in his book, where he used Twin block for mandibular advancement in combination with intermaxillary traction.⁷

William Clark has described a few cases with similar age profiles in his textbook. In one of the cases, 42-year-old 8-month-old patient is described with a chief complaint of flared upper incisors due to lack of bony support where periodontally compromised teeth were present. Thus a combined extraoral and intermaxillary traction was applied using a concord face bow along with a conventional twin block appliance, to accelerate tooth movement, followed by fixed orthodontic treatment. The total duration of treatment was 12 months whereas the twin block phase was 4 months. In this case, post-treatment records suggest that no skeletal change took place only the upper dentition was retracted and the lower dentition moved mesially.⁷

In the textbook by Clark, he also described a case of a 17-year-old 4-month-old male patient with class II division I malocclusion with skeletal class I base with horizontal growth pattern. Conventional twin block appliance was delivered to this patient, where overjet reduction took place from 10 mm to 6 mm in 6 weeks. Upper incisors were retracted and lower incisors got proclined.⁷

Anezi et al gave the classic twin block in a 13-year-old male patient in which they achieved a Class I skeletal relationship and reduction in overjet and overbite. Lower incisor proclination was increased and there was minimal change in upper incisor inclination.⁸ In our case lower incisor proclination was minimal and periodontal injury was not present as compared to conventional twin block. This difference may be due to the appliance design.

Pacha et al have done a randomized control trial in to check the efficiency between Hank's Herbst and twin block appliance. Concluded that patient compliance can be best achieved with Herbst appliance compared with twin block and skeletal as well as dentoalveolar changes noted are same for both appliances.⁹

Conclusion

We can conclude from the present case that, myofunctional appliance therapy with modified Essix twin block can work in adult class II patients also, as we achieved skeletal, dentoalveolar, and soft tissue profile correction. Patient compliance and lower incisor proclination are the two main disadvantages of the twin block appliance which we have overcome here by making the appliance from the thermoplastic sheet that covers the lower incisors. Thermoplastic sheets can provide the appliance aesthetic appearance and can prevent lower incisor proclination.

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