Case Report

Treatment of Class II Malocclusion and Impacted Canines with Two-phase Orthodontic Treatment

Abstract

Twin Block appliance has been widely used for the treatment of Class II malocclusions in growing subjects, due to its versatility and its highly compliance nature. There are certain clinical indications where functional appliances can be used successfully in Class II malocclusion as in a growing patient. In using these appliances, the main concern is compliance of patients. This appliance simplifies the progression of treatment with fixed orthodontic braces later on. In this case, a 14-year-old adolescent was treated with Twin Block appliance followed by fixed appliances for finishing and detailing. The design and treatment effects are demonstrated in this case report.

Keywords: *Class II, functional appliance, skeletal maturation, Twin Block*

Vaibhav Gandhi, Falguni Mehta, Hrishabh Joshi

Department of Orthodontics, Government Dental College and Hospital, Ahmedabad, Gujarat, India

Introduction

Myofunctional appliances are defined as an orthodontic appliance that uses the forces generated by the muscles to achieve dental and skeletal changes. These appliances have been used in clinical orthodontics since long ago and can be found extensively in the orthodontic literature.[1] This kind of appliances is available in either removable or fixed form. The mode of action of these appliances may differ depending on the design; however, their effect is produced from the forces generated by altering the balance of the forces of the musculature.[2,3] There are a number of clinical situations in which the functional appliances can be used successfully in correcting Class II malocclusion in growing patient.[4] Clark[5] introduced the Twin Block appliance to the orthodontic fraternity. It is the most commonly used functional appliance due to its acceptability by patients and simplified design. The Twin Block appliance along with good patient compliance gives fast and excellent results and this is why it has become a popular choice for growth guidance and alteration in Class II division one malocclusion.

The Twin Block appliance consists of two sets of acrylic blocks inclined at 70° to induce occlusal forces that guide the mandible forward. This treatment modality stimulates mandibular growth and simultaneously restricts maxillary growth due to its headgear effect.[5]

In 2003, O'Brien *et al*.[6] had carried out a study with sample size of 174 children (8–10 years of age) showing Class II division 1 malocclusion. Randomization was done to categorize them in control/untreated and treatment groups. Results indicated that treatment with Twin Block appliance is successful in overjet reduction, achieving Class I molar and canine relation and reducing the severity of malalignment in growing age. Majority of changes were dentoalveoler in nature, but some improvement was due to skeletal correction. This study shows that treatment with Twin Block appliance in growing patient is effective in overjet reduction and lessens the severity of malocclusion. In contrast to this study, in 2005, Sidlauskas[7] did a study on cephalometric radiographs of 34 subjects with Class II division 1 malocclusion treated by Twin Block appliance. Depending on his result data, he concluded that increase in mandibular length (net effect 2.3 mm) and reduction in overjet (net effect 4.9 mm) can be successfully achieved with treatment by Twin Block appliance. In 2014, Sharma *et al*.[8] presented study with motive of cephalometric evaluation of skeletal and dentoalveolar changes after using Twin Block appliance in 10 children with Class II division 1 malocclusion due to retruded mandible in growing age (9–13 years age group). In conclusion of their study, they have

How to cite this article: Gandhi V, Mehta F, Joshi H. Treatment of class II malocclusion and impacted canines with two-phase orthodontic treatment. Contemp Clin Dent 2017;8:161-6.

Address for correspondence:
Dr. Vaibhav Gandhi,
D/1, New Anjali Society,
Opp Sun Power Flats,
Nr. Vishramnagar,
Gurukul Road, Memnagar,
Ahmedabad - 380 052,
Gujarat, India.
E-mail: smiledesigner1988@gmail.com

Access this article online

Website: www.contempclindent.org

DOI: 10.4103/ccd.ccd_394_16

Quick Response Code:

mentioned that marked maxillary (SNA) restraining effect sagittally which is also be called as head gear effect. The result was also suggesting that significant mandibular sagittal advancement (SNB) along with increased in mandibular length. Reduction in ANB and Wits appraisal considerably leads to improvement in profile and facial esthetics. Furthermore, they mentioned that Class II correction was due to the combination of skeletal and dentoalveolar changes.

Based on these studies, we usually prefer Twin Block appliance to other functional appliances in phase one treatment of patient with Class II division 1 malocclusion due to retruded mandible in growing age. Here, we presenting is a case report of a 14-year-old adolescent female patient treated in two phases; first, the functional phase using the Twin Block appliance, followed by the second phase of fixed orthodontic appliance with all the four impacted canines which were brought into proper alignment.

Case Report

Diagnosis and treatment planning

A 14-year-old adolescent female patient came to the Department of Orthodontics with the chief complaint of upper front teeth coming outward. Clinical examination revealed that the patient had Angle's Class II division 1 molar relationship superimposed over skeletal Class II base relationship with orthognathic maxilla and retrognathic mandible having horizontal growth pattern. This was well reflected by her cephalometric data (SNA: 80°, SNB: 72°, ANB: 8°, and Wits appraisal was 10 mm) with increased overjet and overbite [Table 1]. According to McNamara analysis, maxillary and mandibular lengths were 89 mm and 105 mm, respectively, with maxillomandibular differential being 16 mm (small). Extraoral examination showed nonconsonant smile arc, increased incisor display at rest, convex soft tissue profile with retruded chin, deep mentolabial sulcus, and visual treatment objective positive. Intraoral findings were showing 17 mm of overjet, 7 mm overbite, and 4 mm of curve of Spee. The patient presented with all permanent teeth erupted, including all second molars except that all four deciduous canines were retained with impacted permanent canines [Figures 1 and 2]. Cephalometric findings, as shown in Table 1, indicate a Class II maxillomandibular base relationship in conjunction with horizontal growth pattern, the upper incisors proclination along with the cervical vertebral maturity

Table 1: Cephalometric parameters

Parameters	Pretreatment	Postfunctional	Postdebonded
SNA	80	79	79
SNB	72	75	75
ANB	8	4	4
Nasion perpendicular to point A	−1	−0.5	−0.5
Pogonion to nasion perpendicular	−12	−7	−8
NA-Apg (angle of convexity)	12	8	8
Facial angle	84	85	85
Maxillary length	89	89	89
Mandibular LENGTH	105	110	110
Maxillomandibular differential	16	21	21
Wits appraisal	10	3	3
Jaraback's ratio (%)	67.59	66.32	66.07
FMPA	20	23	24
Facial angle (NPg-FH)	84	85	85
Facial axis angle (Ba-Na to ptm-Gn)	93 (+3)	92 (+2)	92 (+2)
SN-GoGn	27	29	29
Saddle angle (N-S-Ar)	140	140	140
Articular angle (S-Ar-Go)	123	120	120
Gonial angle (Ar-Go-Gn)	125	125	127
Upper gonial angle (Ar-Go-Na)	60	57	59
Lower gonial angle (N-Go-Me)	65	68	68
effective mandibular length	105	110	109
Upper incisor to SN	121	107	100
Upper incisor to palatal plane (maxillary plane)	127	110	105
IMPA	99	103	103
Nasolabial angle	92	111	112
Lower anterior facial height (%)	58.18	60.20	61.61
Superior sulcus depth (mm)	10	6	5
Upper lip strain (mm)	7	10	11
Inferior sulcus to H line (mm)	9	4	4

Figure 1: Pretreatment photographs

Figure 2: Pretreatment radiographs

index of stage 3. Based on these findings and study models, we extracted the index of orthodontic treatment need (IOTN), which was showing a definite treatment need with dental health component (DHC) of grade 5 and esthetic component of grade 8. Moreover, we also calculated the index of orthognathic functional treatment need for this patient, which is derived from DHC of IOTN,[9-11] and it was grade 5.2. Meaning that this patient with same cephalometric features and skeletal deformity as well as occlusal traits in adulthood would have needed orthognathic surgery; however, considering the growing state of patient, we decided to proceed with the Twin Block appliance therapy.

Treatment objectives

- Phase-I:
  1. Achieve normal overbite and overjet
  2. Achieve super Class I molar relationship.
- Phase-II:
  1. Level and align the arches
  2. Close the upper labial segment space
  3. All four impacted canines are to be exposed and brought into the arch
  4. Achieve Class I molar and canine relationship
  5. Maintain facial balance and esthetics.

Treatment rationale

Use of the functional appliance (removable Twin Block appliance) falls in the Phase I treatment to reduce the overjet, achieve Class I molar relationships, and gain anchorage at the start of treatment to simplify the fixed appliance stage. We had used modified Twin Block appliance with labial bow. The purpose of retaining deciduous teeth was to maintain space for permanent canines. We do not want canine space in upper arch to be closed on activation of labial bow after few months of starting functional therapy. For lower arch, canines were erupting lingually and there was not enough space without orthodontically regaining space for them and these were the reasons to retain deciduous canines in phase 1. This phase was followed with upper and lower fixed appliances (MBT 0.022" slot brackets) to close spaces and get all the impacted canines into alignment follow by detailing and finishing off the case.

As an alternate treatment plan, using Class II intermaxillary traction with only fixed therapy was an option but the

disadvantage would be difficulty in achieving Class I molar relation. Moreover, anchorage reinforcement would be mandatory and there would be only dentoalveolar changes with lower anterior proclination without any skeletal improvement.

Figure 3: Photographs with twin block appliance

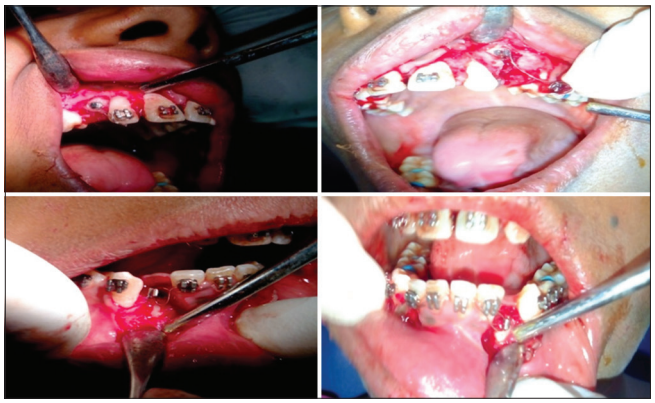

Figure 4: Surgical exposure of all four impacted canines and attachment given at the time of exposure

Treatment progress

Treatment was started with removable Twin Block appliance. The appliance was monitored every 3 weeks and it was kept overall for 11 months [Figure 3]. After achieving functional correction phase II treatment with fixed appliance was started using 0.022" MBT prescription. Sequentially, wire progression was done from 0.014" NiTi, 0.016" NiTi, 0.017" × 0.025" heat activated NiTi, 0.017" × 0.025" stainless steel wire. After that, all the four over retained deciduous canines were extracted and surgical exposure of all four permanent canines was done. Attachments were given to all the canines during exposure and they were brought into alignment using piggyback NiTi technique. Then, wire progression was done up to 0.019" × 0.025" stainless steel and the case was finished. Total treatment duration was 24 months including 11 months of phase I and 13 months of phase II [Figures 4-7].

Results and Discussion

Twin Block functional appliance has several well-established advantages including the fact that it is well accepted by patients, robust, easily repairable and can be used in permanent as well as mixed dentition.

Figure 5: Posttreatment photographs

Figure 6: Posttreatment X-rays

The primary objective of utilizing Twin Block therapy remains the same as that of other functional appliances, i.e., inducing the growth of condylar cartilage which leads to increase in the mandibular length and restriction of the maxillary growth. The mandibular length (Co-Gn) increased significantly by 4 mm which proved the above fact. The distance from nasion perpendicular to pogonion point is increased by 5 mm in the present case which is clinically significant. Similar results have been reported by Sidlauskas.[7] Maxillomandibular sagittal relationship has improved as angle ANB decreased to 4°. The articular angle is a constructed angle between the upper and lower parts of the posterior contours of the facial skeleton. After the treatment, overall gonial angle has increased by 2° and lower gonial angle has improved 3°. This increase in lower gonial angle leads to increase in the mandibular plane angle. These findings are in accordance with Pancherz, who found an increase in the gonial angle.[12] He concluded that, changing the muscle functions or by sagittally directing condylar growth, there could be some reduction of the gonial region. This growth modification as suggested by the increase in gonial angle has previously been described as "posterior mandibular morphogenetic rotation." It is a biological mechanism which causes greater increase in total mandibular length, and thus, efficiently improving the skeletal sagittal relationships in Class II malocclusion. Superior sulcus depth had reduced from 10 to 5 mm and upper lip strain improved from 7 (+6 mm) to 11 mm (+2 mm). Inferior sulcus depth reduced from 9 to 4 mm, these findings coincide with work of Bergman *et al*.[13]

Conclusion

The effect of Twin Block functional appliance in majority is dentoalveloar with small skeletal component. There are a number of situations where functional appliances can be successfully used to correct Class II malocclusion. It is important that functional appliances are used in a growing patient to achieve the maximum benefit. They simplify the following phase of fixed appliance by gaining anchorage and achieving Class I molar relationship. In this case, the patient was treated with Twin Block appliance followed by fixed appliance phase. The design and effects of the appliance were demonstrated in this case report.

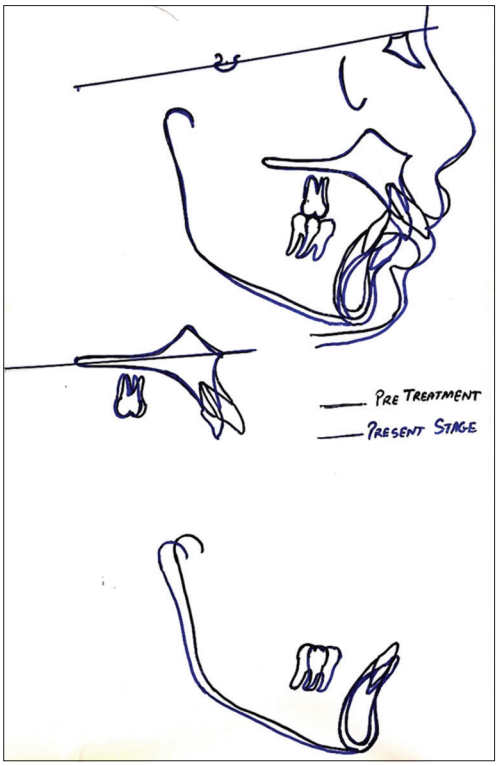

Figure 7: Pretreatment and posttreatment superimposition

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.

References

1. O'Brien K, Wright J, Conboy F, Chadwick S, Colony I, Cook P, *et al*. The effectiveness of treatment of class II malocclusion with the twin block appliance: A randomised, controlled trial. Part 2: Psychological effects. Am J Orthod Dentofacial Orthop 2003;124:488-95.
2. Mills CM, McCulloch KJ. Treatment effects of the twin block appliance: A cephalometric study. Am J Orthod Dentofacial Orthop 1998;114:15-24.
3. Mills JR. The effect of functional appliances on the skeletal pattern. Br J Orthod 1991;18:267-75.
4. Lund DI, Sandler PJ. The effects of twin blocks: A prospective controlled study. Am J Orthod Dentofacial Orthop 1998;113:104-10.
5. Clark WJ. The twin block technique. A functional orthopedic

appliance system. Am J Orthod Dentofacial Orthop 1988;93:1-18.
6. O'Brien K, Wright J, Conboy F, Sanjie Y, Mandall N, Chadwick S, *et al.* Effectiveness of early orthodontic treatment with the twin-block appliance: A multicenter, randomized, controlled trial. Part 1: Dental and skeletal effects. Am J Orthod Dentofacial Orthop 2003;124:234-43.
7. Sidlauskas A. Clinical effectiveness of the twin block appliance in the treatment of class II division 1 malocclusion. Stomatologija 2005;7:7-10.
8. Sharma AK, Sachdev V, Singla A, Kirtaniya BC. Skeletal and dentoalveolar changes concurrent to use of twin block appliance in class II division I cases with a deficient mandible: A cephalometric study. J Indian Soc Pedod Prev Dent 2012;30:218-26.
9. Ireland AJ, Cunningham SJ, Petrie A, Cobourne MT, Acharya P, Sandy JR, *et al.* An index of orthognathic functional treatment need (IOFTN). J Orthod 2014;41:77-83.
10. Harrington C, Gallagher JR, Borzabadi-Farahani A. A retrospective analysis of dentofacial deformities and orthognathic surgeries using the index of orthognathic functional treatment need (IOFTN). Int J Pediatr Otorhinolaryngol 2015;79:1063-6.
11. Borzabadi-Farahani A, Eslamipour F, Shahmoradi M. Functional needs of subjects with dentofacial deformities: A study using the index of orthognathic functional treatment need (IOFTN). J Plast Reconstr Aesthet Surg 2016;69:796-801.
12. Pancherz H. The mechanism of class II correction in Herbst appliance treatment. Am J Orthod Dentofacial Orthop 1982;82:104-13.
13. Bergman RT, Waschak J, Borzabadi-Farahani A, Murphy NC. Longitudinal study of cephalometric soft tissue profile traits between the ages of 6 and 18 years. Angle Orthod 2014;84:48-55.