Twin Block Functional Therapy In Class II Division 1 Malocclusion : A Case Report

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Abstract

The effect of the Twin Block functional orthodontic appliances is mostly dento-alveolar with small skeletal effect. There are certain clinical indications where functional appliances can be used successfully in class II malocclusion e.g. in a growing patient. The use of these appliances is greatly dependent on the patient's compliance and they simplify the fixed appliance phase. In this case, a 12-year old adolescent was treated with Twin Block appliance followed by fixed appliance to detail the occlusion. The design and treatment effects are demonstrated in this case report.

Keywords: Class II malocclusion; Twin Block appliance; Case report

Introduction

Class II malocclusion due to mandibular retrognathism in growing individual is not an uncommon thing to be seen in our daily practice and it needs an urgent attention of the clinician as utilization of growth for skeletal correction is utmost important. Twin block remains the most popular functional appliances till date for correction of class II malocclusion in growing individuals. The Twin Block is a relatively simple system that uses upper and lower bite blocks. These blocks reposition the mandible and redirect occlusal forces to achieve correction of the malocclusion. They are also relatively comfortable and have good compliance associated with them. Since from its introduction to orthodontic community in 1870 by W.J Clark,[1] there were many studies addressing the effectiveness of this appliance.

The following is a case report of a 12-year old male patient with class II skeletal base and average growth pattern treated by a Twin Block functional appliance in combination with fixed appliance to manage his class II malocclusion.

Case Report

A male patient aged 12 years came to the Department of Orthodontics with the chief complaint of forwardly placed upper front teeth. He had Dolicocephalic head type and leptoprosopic face type with convex profile and posterior divergence. Lips were incompetent with reduced Nasiolabial angle and deep mentolabial sulcus. Intra-oral examination showed mixed dentition. He had Angle's class II molar relationship, overjet of 12 mm and overbite was 6mm with maxillary midline coinciding with the facial midline but mandibular midline was shifted to right by 2mm. Mild spacing in the upper arch and mild crowding in the lower arch was noted. Cephalometric analysis revealed a Skeletal Class II relationship (ANB 6⁰) because of mandibular retrusion (SNB 74 degree). The mandibular plane angle (GoGn-SN- 32 degree, Y-axis 63 degree) showed an average growth pattern. Dental component showed proclination of upper incisors. The patient was diagnosed as Angle's class II Division I malocclusion on skeletal class II jaw bases due to retruded mandible with average growth pattern and convex profile. The goal of the orthodontic treatment was to correct mandibular retrognathism, to reduce overjet & overbite and achieve Class I molar relation using non extraction approach. It was decided to treat the case with Twin Block functional appliances followed by fixed orthodontic therapy which would provide necessary mechanics to achieve our aim.

The main objectives for phase I of the treatment were as follows:
1. Reduce the overbite and overjet.
2. Achieve class I molar relationship.
In phase II of the treatment, the aims were:
1. Relieved lower arch crowding.
2. Level and align the arches.
3. Close upper labial segment space.
4. Achieve class I canine and incisor relationship.

Treatment progress

Phase I of treatment involved the use of functional appliance (Clark Twin Block appliance) to reduce the overjet, achieve class I molar relationships at the start of treatment to simplify the fixed appliance stage.

Upper and lower impression was made for bite registration. Bite was registered using modelling wax so that mandible is brought forward to bring molar in Class I position. Positive VTO was confirmed at this bite position. Models with the bite were articulated and Twin block was fabricated using cold cure acrylic. This phase was followed with upper and lower fixed appliances (0.018″ slot brackets) to close spaces, detailing and finishing of the case. The aims of the functional treatment phase were achieved successfully due to good patient compliance. Active phase of Twin block continued for 9 months. Trimming of upper block was started and separators were placed proximally to molar so as to assist in eruption. After 3 months of trimming, three point contacts were achieved and Twin block was discontinued later on. Fig 1.(1a, 1b, 1c, 1d, 1e, 1f)

The second phase of treatment with the fixed appliances aimed to close the remaining spaces and finish the case which lasted 6 months Fixed orthodontic treatment was started with 0.018" MBT system. An initial 0.016" NiTi round wire followed by 0.016 x 0.022" NiTi wire was used for

Table 1
Pre and post treatment cephalometric appraisal

CEPHALOMETRIC MEASUREMENTS	NORMAL	PRETREATMENT	POST TREATMENT
Sella-Nasion- A-point * (SNA) (degree)	82 ± 2	80	79.5
Sella-Nasion- B-point # (SNB) (degree)	80 ± 2	74	77.5
ANB (SNA- ANB) (degree)	2	6	2
Maxillary length (Co to A-point)	92 mm	90 mm	90
Mandibular length (Co to Pogonion)	114 mm	113 mm	114
Y Axis (Nasion- Sella- Gnathion) (degree)	59.3	63	63.5
Facial axis (Ba- Na, Pt-Gn)	0	0	0
SN-GoGn (degree)	32	32	32
Some of posterior angles (degree)	396 ± 6	394	395
Upper incisor to Nasion- A-point (degree/mm)	22 ± 2/4 mm	48, 11mm	28, 5mm
Lower incisor to Nasion- B-point(degree/mm)	25 ± 4/4mm	23, 4mm	25, 4mm
Interincisal angle (degree)	131	103	124
Naso- labial angle (degree)	106 ± 7	90	102

alignment & levelling for 3 months. Finishing and detailing was done by 0.017 x 0.025" NiTi wire followed by 0.017 x 0.025" S-S wire for 3 months. The overall treatment time was 18 months i.e. 9 months functional appliance wear, 3 months supportive phase and 6 months fixed appliance treatment.

Treatment Results

The treatment objectives were achieved. The profile of the patient has improved after the treatment. The lower arch crowding was relieved by proclination of the lower incisors. The spaces of the upper arch were closed during the fixed appliance phase of treatment. The incisor, canine and molar relationships were class I at the end of treatment. The overbite and overjet were reduced to the average values. Retention was provided by removable Hawley's appliance in mandible and Hawley's appliance with reverse inclined plane in maxilla. Fig 2 (2a, 2b, 2c, 2d, 2e, 2f)

Discussion

Dentofacial orthopedics represents a positive approach to the treatment of craniofacial imbalance by addressing the underlying cause of malocclusion, in an effort to maximize the natural potential for corrective growth[2]. A functional appliance displaces the lower jaw downwards and forwards. Repositioning the mandible stimulates a proprioceptive response in the muscles of mastication. The purpose is to encourage adaptive skeletal growth by maintaining the mandible in a corrected forward position for a sufficient period of time to allow adaptive skeletal changes to occur in response to a functional appliance stimulus[3]. Twin Block functional appliance has several well established advantages including the fact that it is well tolerated by patients (Harradine and Gale),[4] robust, easy to repair', independent control of the upper and lower arch and it is suitable to use in the permanent and mixed dentition. There are good three dimensional arch developments in the antero-posterior, transverse and vertical planes. The benefit is shorter treatment time. Patients maintain normal function and appearance because there are no lip, cheek or tongue pads. The patient's appearance is noticeably improved when the appliances are fitted. Twin block appliance clinically significantly increases mandibular length and reduces overjet [5,6]. Functional appliances have a growth modification effect which may be used in the treatment of Class II malocclusion in growing patients. They are associated with an improvement of the sagittal inter maxillary relationship. There are potential disadvantages such as the proclination of the lower incisors and development of posterior open bites [7]. In this case, the treatment objectives were achieved largely due to the good compliance by the patient. The patient's chief complaint was the increased overjet. Thus by reducing the overjet with the functional appliance, the patient's confidence has improved.

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Legends
Fig1. Pretreatment intraoral and extraoral photographs;
- 1a. Frontal,
- 1b. Right lateral,
- 1c. Left lateral,
- 1d. Frontal,
- 1e. Profile,
- 1f. Frontal smiling.

Fig2. Post-treatment intraoral and extraoral photographs;
- 2a. Frontal,
- 2b. Right lateral,
- 2c. Left lateral,
- 2d. Frontal,
- 2e. Profile,
- 2f. Frontal smiling

Fig. 1a

Fig. 1b

Fig. 1c

Fig. 1d

Fig. 1e

Fig. 1f

Fig. 2a

Fig. 2b

Fig. 2c

Fig. 2d

Fig. 2e

Fig. 2f