Case Report

Treatment of a class II malocclusion patient with twin block appliance: a case report

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ABSTRACT

Class II malocclusions in growing patients is commonly encountered and respond well to functional appliances, provided the clinical and cephalometric findings are favourable. In case of class II hypodivergent malocclusion, the hypodivergent pattern is established early and become prominent with progression of time. These patients have significantly smaller mandibular plane angles and smaller gonial angles. This case report describes the treatment planning of a patient of age 14 years with class II malocclusion showing hypodivergent growth pattern and moderate crowding. Treatment was started with twin block functional appliance and non-extraction approach was planned. As the patient was in his peak growth spurt stage, the functional appliance therapy use at this stage was started to take advantage of that. Fixed orthodontic appliances were placed after completion of functional appliance therapy. The treatment resulted in achievement of class I molar relation bilaterally, normal overjet and overbite and favourable soft tissue profile, facial balance and harmony.

Keywords: Class II malocclusion, Hypodivergent growth pattern, Functional appliance

INTRODUCTION

Class II malocclusion is not a single entity and various factors can contribute to the pathology. According to McNamara's research majority of class II skeletal malocclusions were characterized by mandibular retrusion with neutral maxillary position.[1] The factors favourable for obtaining a good response in treatment of a class II malocclusion with functional appliances depend on the age and growth pattern of the patient, presence or absence of crowding in the arch, incisor proclination and last but not the least, patient cooperation.[2] Identifying the skeletal and dental components of a class II malocclusion is important as some of them can be masked.

This case report presents a 14-year-old male patient with class II malocclusion presenting with convex profile, retrusive mandible, increased overjet and moderately crowded arches treated with twin block functional appliance

CASE REPORT

Diagnosis and etiology

A 14 years old male patient came to the department of orthodontics with a chief complaint of forwardly placed upper front teeth.

No significant information was elicited on recording prenatal and postnatal history and childhood diseases.

His extraoral examination showed that the patient was mesocephalic and mesoprosopic with convex profile and

incompetent lips (Figure 1). His intraoral examination showed class II molar on right and class I on left, overjet of 8.5 mm and overbite of 2.5 mm. crowding in upper anterior and lower anterior and posterior region, palatally inclined 35, fractured 21 and 22, lower midline shift of 2 mm on right (Figure 2). All the teeth were present except the third molars.

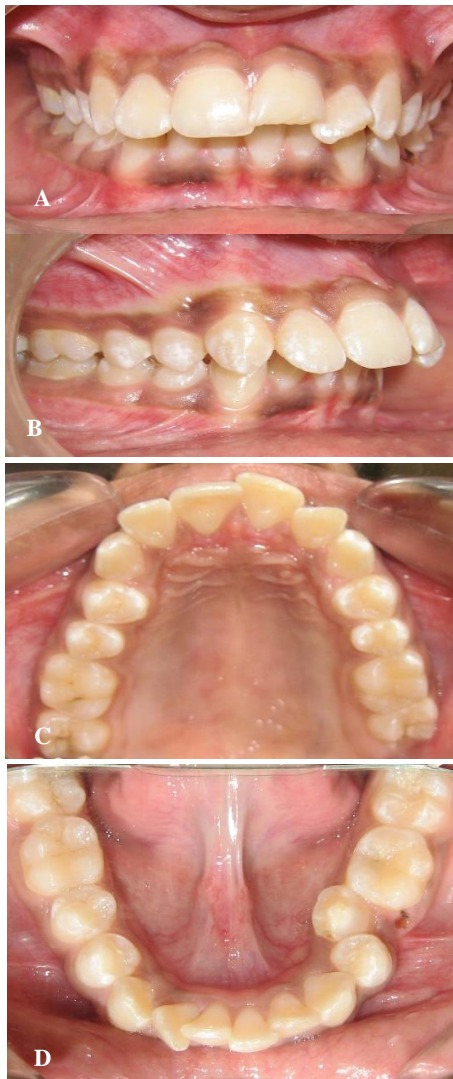**Figure 1(A and B): Pre-treatment extra-oral photos.**

Figure 2 (A-D): Pre-treatment intra-oral photos.

Radiographic examination

His pre-treatment orthopantomogram (Figure 3) showed no pulpal, periodontal/ temporomandibular joint pathology.

On examination of his pre-treatment lateral cephalogram (Figure 4) it was revealed that the patient was having a skeletal class II malocclusion on account of ANB angle of 6 degrees, SNB angle of 74 degrees, beta angle of 23 degrees, mandibular effective length of 104 mm indicating a short mandible, saddle angle of 140 degrees, posterior cranial base length of 27 mm and distance from TVL to chin (-15 mm) indicating a backwardly placed mandible. The patient had a hypodivergent growth pattern on account of FMA 21 degrees. The upper incisors were positioned normally with respect to TVL (-9 mm) but were proclined on account of upper incisor to palatal plane value of 135 degrees. The lower incisors were also proclined. He had an increased nasolabial angle on account of his upwardly turned nose.

Figure 3: Pre-treatment orthopantomography.

Figure 4: Pre-treatment lateral cephalogram.

So, the patient was diagnosed as a case of class II skeletal pattern with horizontal growth pattern. Angle's class II div 1 with bi-dental proclination, increased overjet, crowding in upper and lower anterior teeth, incompetent lips, obtuse nasolabial angle and shallow mentolabial sulcus.

The patient was in cervical stage (CS) 4 according to the CVM method of growth estimation indicating he was in the stage of peak mandibular growth.

The visual treatment objective (VTO) of the patient was positive for functional appliances.

Treatment objectives-Correction of mandibular deficiency, relief of crowding in lower and upper arches, lower midline coinciding and achieving a pleasing soft tissue profile.

Treatment plan

Non-extraction mode of treatment, twin block appliance to correct the mandibular deficiency followed by alignment, levelling and closing of space.

Treatment progress

Treatment was started with recording the construction bite of the patient and constructing a twin block appliance for the patient (Figure 5). The appliance was placed and the patient was instructed to wear the appliance only during daytime for first one week to make the patient comfortable and then continue to wear it both during the day and night time. The patient was checked twice a month for first two months and then once in every month. The pterygoid reflex was obtained in the third week of treatment. The treatment time with functional appliance was 8 months. The support phase was 3 months.

After the completion of the functional appliance treatment, an upper anterior inclined bite plate was placed as a retainer. The post-functional records show favourable values obtained. The multi-bracketed treatment was started with bonding of 0.022" 0.028" MBT (3M UNITEK) brackets and placement of 0.016 NiTi in both the arches. This was followed by placement of 0.018 SS wires in both the arches with overlay 0.016 NiTi wire to correct the crowding and rotations, followed by 0.019"×0.022" NiTi and SS wires (Figure 6). Second order bend was given with respect to upper right lateral incisor to correct the root inclination as seen on pre-finishing OPG. The settling was done with class II elastics followed by triangular elastics.

Upon removal of fixed appliances an upper removable Begg wrap around retainer and a lower fixed lingual retainer was placed.

Figure 5 (A and B): Patient wearing twin-block appliance.

Figure 6: 0.019"x 0.022" stainless steel wires placed.

Treatment results

A good balanced facial profile with overjet and overbite within normal range were obtained as seen in Figure 7 and 8.

The post-treatment lateral cephalograms and OPG are seen in Figure 9 and 10 respectively.

The pre-treatment, post-functional and post-treatment comparative cephalometric values are summarised in Table 1.

Table 1: Pre-treatment, post-functional and post-treatment comparative cephalometric values.

| Sagittal discrepancy analysis				
Hard tissue analysis	**Normal**	**Pre-treatment**	**Post-functional**	**Post-treatment**
ANB	2°	6°	2°	3°
AO to BO	0-1 mm	2 mm	1 mm	2 mm
Beta angle	27-37	23°	30°	25°
NA-Pog	0-5	11°	3°	7°
Max: Mand	2:3	2:2.84	2:2.8	2:2.8
Mcnamara's unit length difference		16 mm	26 mm	26 mm
Soft tissue profile angle	161	152°	155°	158°
Total tissue profile angle	M137/f133	131°	130°	131°
TVL to chin	-3.5/-2.5 mm	-15 mm	-14 mm	-11.5 mm
Maxillary apical base				
SNA	82±2	80°	78°	79°
MAX size-ANS-PNS		50 mm	54 mm	54 mm
Max effective length Co-point A		88 mm	92 mm	93 mm
Mandibular apical base				
SNB	80±2	74°	76°	76°
N ⊥ TO Pog	-2 mm	-17 mm	-11 mm	-9.5 mm
Mand effective length		104 mm	112 mm	112 mm
Effect of gonial angle	128±7	122°	122°	119°
Effect of ramus orientation S-Ar-Go	143±6	140°	139°	143°
Vertical discrepancy analysis				
Hard tissue analysis				
Mid/lower face ht	45:55	45:46	46:54	48:59
Sn-go-gn	32°	29°	29°	28°
FMA	25°	21°	21°	20°
Jarabak ratio	62-65%	65%	68%	69.5%
Saddle angle	123±5	130°	131°	130°
Articular angle	143±6	140°	139°	143°
U-gonial angle	52-55	54°	53°	50°
L-gonial angle	70-75	70°	70°	69°
Basal plane angle	25°	17°	19°	20°
Dentoalveolar analysis				
Upper arch				
U1-NA	22°,4mm	42°,9mm	31°,10 mm	30°,7mm
U1-point a vertical	2-4 mm	7 mm	8 mm	7mm
U1-palatal plane	110°-115°	135°	119°	117°
U1-TVL	-9 mm	-9 mm	-11 mm	-9mm
Lower arch				
L1-MP	95°	108°	110°	108°
L1-NB	25°, 4 mm	30°, 5 mm	29°, 8 mm	31°, 8 mm
Soft tissue analysis				
Upper arch				
Nasolabial angle	102±8	100°	111°	109°
U lip thickness	13-14 mm	13 mm	15 mm	14 mm
Lower arch				
Mentolabial angle		51°	110°	106°
Inter-incisal angle		103°	112°	110°
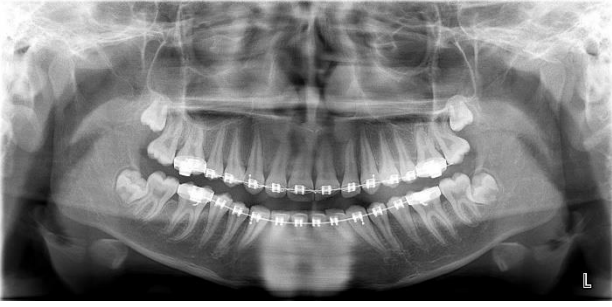
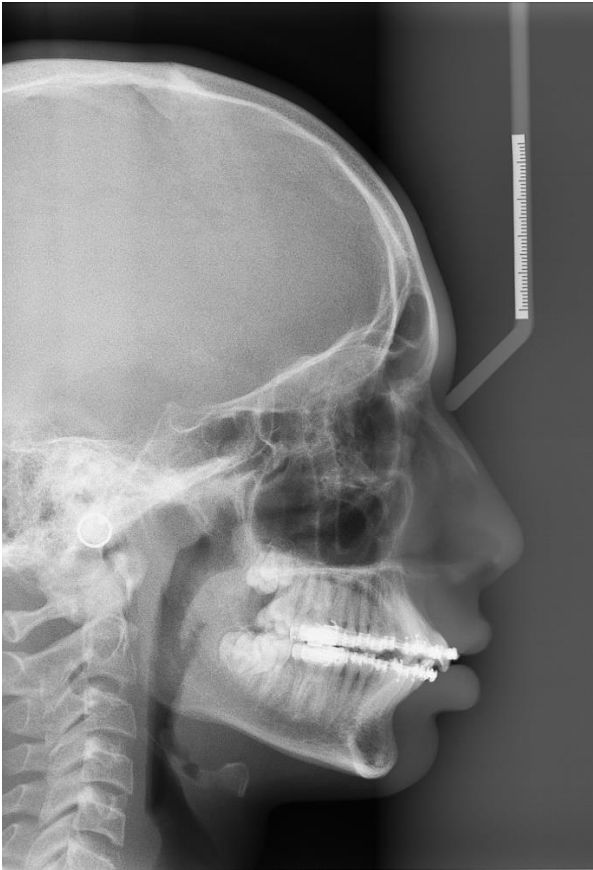**Figure 7: Pre-finishing orthopantomography.**

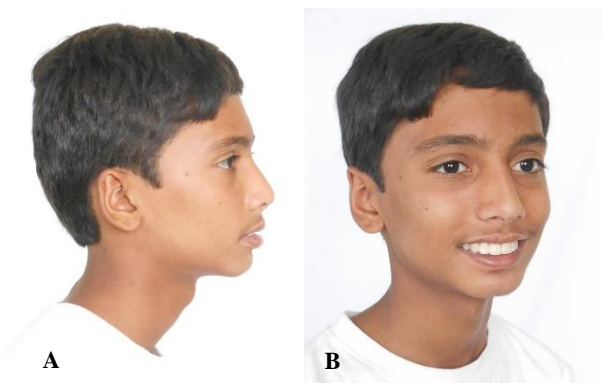**Figure 8: Pre-finishing lateral cephalogram.**

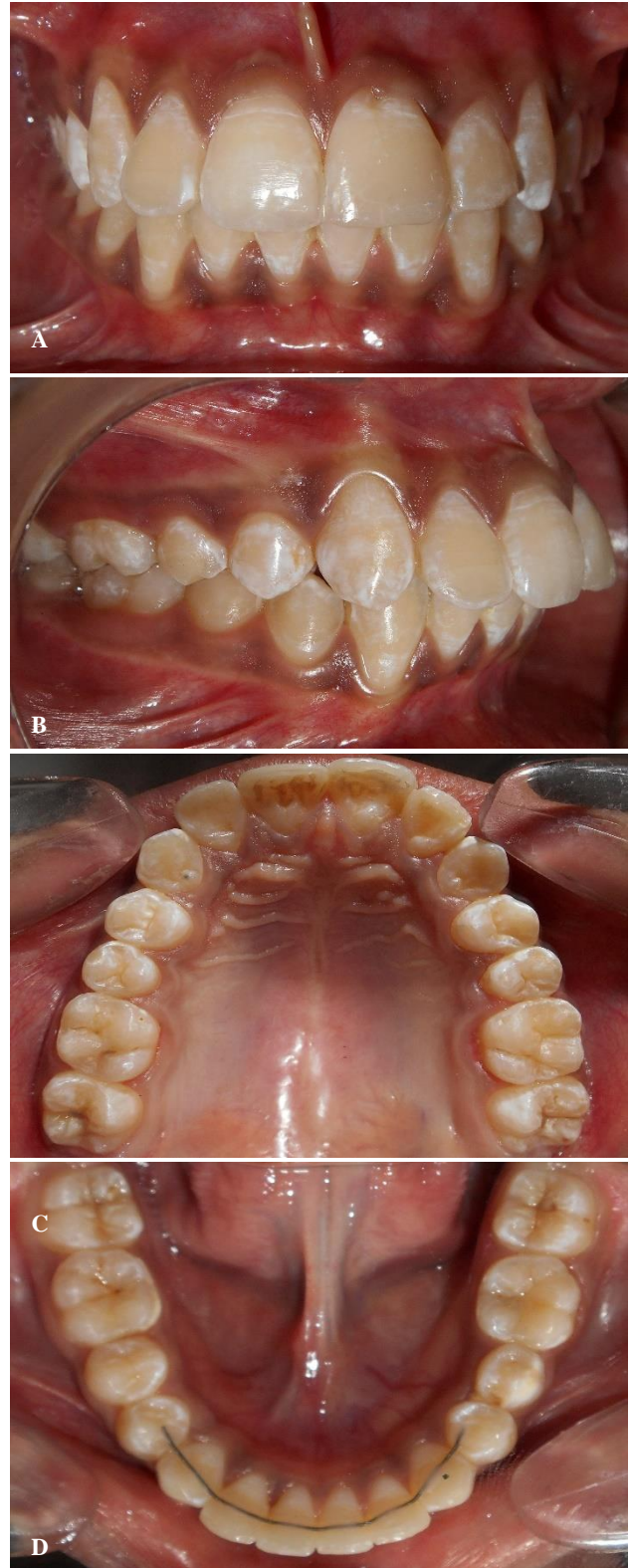**Figure 9 (A and B): Posttreatment extra-oral photos.**

Figure 10 (A-D): Post-treatment intra-oral photos.

DISCUSSION

Functional appliances, by altering the position of the teeth and supporting tissues, establish an optimal functional behavioural pattern which leads to adaptive

changes in the bone form and helps the dentofacial complex achieve its optimal genetic growth potential.[2-3]

Twin block appliances are simple bite blocks designed for full time wear that achieve rapid functional correction of malocclusion by the transmission of favourable occlusal forces to occlusal inclined planes that cover the posterior teeth.[4-5]

The objectives of early orthodontic intervention are to correct obvious problems and to intercept developing problems. Class II malocclusion of more than 6mm of overjet if treated early with functional appliance can help in resolution of various problems like eliminating functional problems, improving the skeletal discrepancy, reducing the overjet and improving the profile.[6-12]

Quite a few studies have helped us in understanding the mechanism of class II correction with functional appliances and the effect of Twin block appliance therapy. Anterior bodily movement of the mandible with elongation in condylar and ramal areas consequent to functional appliances help in class II correction. Changes in lower anterior and posterior face heights and posterior tipping of upper incisors are other contributing factors.[13] Increase in the sagittal direction of hypo-and oropharynx, increase in mandibular length in either Co-Pog or the Co-Gn dimensions are also noted.[14-16] Better levels of stability were achieved when functional appliance treatment was followed with fixed appliances.[17]

The goal in developing the twin block technique was to maximize the growth response to functional mandibular protrusion by using an appliance that is simple, comfortable and esthetically acceptable to the patient

There was a change in 3 and 2 degrees in the ANB angle and SNB angle respectively, 8 mm in the effective mandibular length. There was a favourable change in the ratio of mid to lower facial height. Normal overjet and overbite were achieved due to favourable changes in the inclination of upper and lower anterior teeth.

CONCLUSION

The twin block functional appliance is effective in correction of class II malocclusion in growing patients and is easily acceptable by patients.

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