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A CEPHALOMETRIC EVALUATION OF CLASS II DIVISION 1 ORTHODONTIC PATIENTS TREATED WITH TWIN BLOCK APPLIANCE

Dental Science

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ABSTRACT

Objective: To evaluate and compare the treatment changes with Twin block appliance in class II division 1 malocclusion patients.
Materials and methods: Twenty subjects with Class II division 1 malocclusion were chosen. The subjects were treated with Twin block appliance (n = 20; mean age: 11.2yrs). Pre-functional and post-functional cephalograms were traced and subjected to analysis.
Results: Skeletal effects seen as increase in mandibular length were significant. Overjet correction with Twin block occurred mainly as a result of mandibular repositioning and growth. Differential eruption of mandibular molars was observed. Changes in lip position improved the overall profile.
Conclusions: Twin block is effective in correcting Class II malocclusion, however Twin block causes more skeletal changes than dentoalveolar.

KEYWORDS

Twin Block, Class Ii Malocclusion, Removable Functional Appliance

INTRODUCTION

Angle's Class II division 1 malocclusion is one of the major challenges for an orthodontist. It comprises nearly half of the treatment protocols (11%). Mandibular retrognathia is seen as a major clinical entity in majority of patients.[1] Angle's Class II division 1 malocclusion may be a skeletal discrepancy which can be corrected by functional appliance therapy during growth period. The objective of functional appliance therapy is to promote harmonious facial growth by changing the functional muscle environment around the developing dentoalveolar structures.[2-5] The major differences in the effects between various functional appliances are mainly related to the technique of fabrication, construction bites, and hours of wear. Various removable and fixed functional appliances are available today. Among removable functional appliances Twin-block is most commonly used nowadays in correcting a Class II malocclusion. Moreover, removable appliances are considered uncomfortable and unaesthetic by many patients and require patient compliance. Consequently, fixed functional appliances have come up to overcome from the need for patient cooperation.[6,7]

A review of dental literature reveals a number of functional appliances for correction of Class II malocclusion.[3,8-10] Clark demonstrated the effects of his patent Twin block appliance in correcting Class II malocclusion, particularly involving skeletal discrepancies. Twin block appliance has a high level of patient acceptance because of its small size and more aesthetic appearance than other removable appliances for class II correction.[9,11]

AIMS AND OBJECTIVES

The present study was conducted in an attempt to evaluate the treatment effects of removable (Twin block) appliance and compare pre and post treatment changes.

MATERIALS AND METHODS

The present retrospective study was conducted on pre and post treatment lateral head cephalograms of 20 Angle's Class II division 1 malocclusion subjects treated with Twin block. The cephalograms were taken before the functional appliance placement and immediately after the appliance removal. All the lateral head cephalograms were obtained from the patient record file of the Department of Orthodontics and Dentofacial Orthopaedics, Faculty of Dental Sciences, King George Medical University, Lucknow, India. Each included subject met the following

Inclusion Criteria:

1. Skeletal class-II malocclusion with retrognathic mandible and class II or End on molar relationship.
2. Subjects were having ANB angle more than 4^0.
3. Mixed dentition or early permanent dentition subjects.
4. Subjects were under their active growth period (CVMI-2,3,4).

For standard Twin block appliance, a single step mandibular advancement to achieve class-I molar relationship with 2 mm of interincisal opening was carried out. Labial bow was kept passive. Patient was instructed to wear the appliance for 24 hours a day. Average duration of active phase was 8 months. For the purpose of this study, 25 parameters were used, out of which 17 linear parameters and 8 were angular parameters. Within 17 linear parameters 5 were skeletal (Ramus ht, LAFH, PFH, Mx. length, Md. length), 8 were dental parameters (Overjet, Overbite, U1-NA, L1-NB, U6-PP, U6-Fperp, L6-MP, L6-Fperp) and 4 were soft-tissue parameters (Ls-E, Li-E, Ls-Fperp, Li-Fperp). While in 8 angular parameters 5 were skeletal (SNA, SNB, ANB, Gonial angle, Y-axis) and 3 were dental parameters (U1-NA, L1-NB, SN-OP).

Data were summarized in Mean ± SD. The pre and post functional observations were compared by paired 't' test. Groups were compared by one-way analysis of variance (ANOVA) and the significance of mean difference between the groups was done by Tukey's HSD (honestly significance difference) post hoc test.

RESULTS

Table 1: Evaluation of mean and SD of pre-functional (T1) and post-functional (T2) parameters and mean changes of (Twin block appliance)

S. No	Parameters	(T1) Mean ± SD (n=20)	(T2) Mean ± SD (n=20)	Mean change± SD	'p' value	
1.	Skeletal –Linear (mm)	Ramus ht.	41.78 ± 3.70	45.23 ± 3.65	3.45 ± 0.86	***
2.		LAFH	61.53 ± 5.19	66.43 ± 5.05	4.90 ± 1.10	***
3.		PFH	73.15 ± 5.13	77.90 ± 5.53	4.75 ± 0.82	***
4.		Mx. Length	53.78 ± 2.77	54.48 ± 2.65	0.70 ± 0.47	NS
5.		Md. Length	73.03 ± 4.11	76.48 ± 3.81	3.45 ± 0.97	**
6.	Skeletal–Angular (degree)	SNA	81.45 ± 3.44	80.85 ± 3.12	-0.60 ± 0.95	*
7.		SNB	75.00 ± 3.69	77.63 ± 3.26	2.63 ± 1.47	**
8.		ANB	6.45 ± 1.88	3.28 ± 1.49	-3.17 ± 1.41	**
9.		Gonial angle	126.70 ± 4.46	128.80 ± 4.24	2.10 ± 1.46	*
10.		Y-axis	60.08 ± 4.09	60.50 ± 3.73	0.43 ± 1.99	NS

11.	Dental–Linear (mm)	Overjet	10.50 ± 1.77	4.23 ± 1.08	-6.27 ± 1.83	***
12.		Overbite	5.40 ± 1.57	3.18 ± 1.14	-2.22 ± 1.59	***
13.		U1-NA	7.10 ± 2.15	5.05 ± 1.66	-2.05 ± 1.77	**
14.		L1-NB	5.38± 1.71	7.23 ± 1.83	1.85 ± 1.00	**
15.		U6-PP	19.93 ± 2.56	19.83 ± 2.50	-0.10 ± 0.80	NS
16.		U6-Fperp	40.35 ± 5.37	40.08 ± 5.58	-0.28 ± 1.15	NS
17.		L6-MP	29.30 ± 3.06	31.58 ± 2.96	2.28 ± 0.77	**
18.		L6-Fperp	38.90 ± 5.90	43.90 ± 6.02	5.00 ± 1.28	***
19.	Dental–Angular (degree)	SN-OP	15.30 ± 3.89	15.73 ± 4.09	0.43 ± 1.36	NS
20.		U1-NA	31.15 ± 5 .47	25.65 ± 3.05	-5.50 ± 4.12	*
21.		L1-NB	27.15 ± 4.47	30.70 ± 4.51	3.55 ± 1.66	**
22.	Soft tissue–Linear (mm)	Ls-E	1.73 ± 1.67	-1.13 ± 1.97	-2.86 ± 1.29	**
23.		Li-E	1.33 ± 2.39	1.15 ± 2.32	-0.18 ± 1.66	NS
24.		Ls-Fperp	89.93 ± 5.93	90.48 ± 6.33	0.55 ± 1.39	NS
25.		Li-Fperp	81.95 ± 7.88	84.98 ± 7.10	3.03 ± 2.55	***

*(p values ***<0.001-Highly significant; **<0.01-Moderately Significant; *<0.05-Just significant, NS- Non significant*

DISCUSSION

Skeletal effects

Animal studies have suggested that protracting the mandible can stimulate mandibular condylar cartilage growth, producing significant changes in mandibular morphologic features.[1-5] The present study revealed that Twin block resulted in significant increase in mandibular growth as evidenced by increased mandibular length and SNB angle.[7,12] Increased mandibular growth was due to the fact that it is a tooth and tissue borne appliance which directly transmit the occlusal forces through the inclined plane to the underlying bone ensuing more skeletal changes.[12]

Mandibular morphological changes that occurred during the treatment resulted in increased lower facial height (LAFH), posterior facial height (PFH) and ramus length. Vertical changes seen with functional appliances were because of decreased maxillary molar and increased mandibular molar eruption particularly with Twin block. The present study showed restriction to the forward displacement of maxilla, revealed by decreased SNA angle.

Dentoalveolar Effects

Some studies reported distal movement maxillary molars with twin block but present study didn't reveal such findings.[7,12]

Mandibular molars showed significant increased eruption and mesial movement with Twin block, due to mesially directed force on lower molars by the appliance. Maxillary incisors showed retroclination and decreased angulation. Proclination of lower incisor may be due to the force exerted by the lower plate of Twin block due to forward positioning of the mandible. Overjet correction with Twin block involves both skeletal as well as dentoalveolar changes due to the forward positioning of mandible and lower incisors proclination. Overbite reduced with Twin block due to differential eruption of mandibular molars.

Soft tissue effect

Among soft tissue, most significant changes were seen in upper lip and lower lip position. Upper lip showed retrusion and lower lip showed forward positioning. Significant changes were seen in upper lip position in relation to E-Plane. Overall effect of lip changes leads to improvement of patient profile.

CONCLUSION

Maxillomandibular, dentoalveolar and soft tissue relationships all were improved. Overjet, overbite and molar relationship was improved either by dentoalveolar or skeletal changes. Differential eruption of mandibular molars was seen with Twin block.

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