

Skeletal And Dentoalveolar Changes Seen In Class II Div 1 Malocclusion Cases Treated With Twin Block Appliance- A Cephalometric Study

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Abstract: Class II malocclusion is commonly seen problem in orthodontic practice¹. Its most consistent finding is mandibular skeletal retrusion². During the last ten years Twinblock developed W.J Clark¹. Due to its simplicity of construction and less bulkiness, it has gained increased popularity with the patients as well as with the orthodontist. The present studies have been designed to cephalometrically evaluate skeletal and dentoalveolar changes seen with uses of Twinblock appliance in class II malocclusion with deficient mandible¹. The study was carried out on 12 growing children of Class II div 1 malocclusion in the age group of 9 -13yrs. in present study conclusive evidence of skeletal, dento- alveolar changes leading to correction of class II div 1 malocclusion with Twin block , a functional appliance, has been established

I. Introduction

Class II malocclusion is commonly seen problem in orthodontic practice¹. Its most consistent finding is mandibular skeletal retrusion². When there is mandibular retrognathia, forward positioning the mandible during growth spurts is believe to enhance its growth.

Various types of functional appliance e.g. Activator, Bionator, Frankel, Herbst' appliance are used for correction of class II skeletal and occlusal disharmonies¹. During the last ten years Twinblock developed W.J Clark¹. Due to its simplicity of construction and less bulkiness, it has gained increased popularity with the patients as well as with the orthodontist. Functional appliances have shown to have various effects on maxilla as well as mandible and also on the dentoalveolar structures³.

The present studies have been designed to cephalometrically evaluate skeletal and dentoalveolar changes seen with uses of Twinblock appliance in class II malocclusion with deficient mandible¹.

II. Review Of Literature

In 1998, David O. Morris conducted an evaluation of Bass, Bionator and Twin block appliances on hard tissues and demonstrated statistically significant increase in mandibular length suggesting increase in lower anterior facial height. The anterior movement of the mandible was greatest in the twin block group, followed by Bass and Bionator groups.

In 2005, Antanas Sidlauskas Medicina, Kaunas studied the effects of the Twin block appliance treatment on skeletal and dento -alveolar changes in class II div I malocclusion. Cephalometric analysis was done and concluded that there is statistically significant in increasing mandibular length in 12 month time period of time.

In 2006, Carlos Fores, Paul W. Major conducted a study to evaluate the facial tissue changes after the use of twin block in class II Div I Malocclusion and seen there is soft tissue profile change statistically significant but the magnitude of changes may not be perceived as clinically significant.

In 2006, Ritu Duggal and Ashok Jena et al evaluated a quantitative and qualitative analysis effects of Twin block in treatment of class II Malocclusion on 28 growing children concluded that there is improvement in skeletal imbalance and soft tissues relationship.

In 2011, Omar Yaqoob, Andrew T. Diabase conducted a study on the use of Clark twin block functional appliance with or without an upper labial bow and compared dent alveolar and skeletal changes in two groups concluded there is no influence on dento-alveolar and skeletal changes with added maxillary labial bow but there is effective change in position of mandible with conventional twin block

In 2012, Sharma AK , Sachdeva conducted a study on 10 growing children of 9-13yrs class II Malocclusion was given twin block and seen significant skeletal and dentoalveolar changes and concluded

statistically and clinical significant improvement in forward positioning of mandible which improved the profile and facial esthetics

Aims & Objectives

The study was conducted with following aims

- 1.To evaluate role of twin block on skeletal changes.
- 2.To evaluate the dentoalveolar changes brought out by Twin block.

III. Materials & Methods

The subjects treated with Twinblock appliance were selected from the Department of Orthodontics,CSMSS Dental College and hospital. The study was carried out on 12 growing children of Class II div 1 malocclusion in the age group of 9 -13yrs.

The inclusion criteria were

1. Growing co-operative patients.
2. Maxilla is normal and mandible is retro gnathic
3. Horizontally growing patients
4. Upright lower incisors.

The Exclusion criteria were

1. Nongrowing patients
2. Non co-operative patients
3. Maxilla and mandible prognathic cases
- 4.Vertically growing patients

Method

The present study was carried out in 12 growing children of class II division I Malocclusion in the age group of 9- 13yrs .All the patients were treated with Twin Block therapy. Lateral cephalograms were taken at start and at the end of the Twin block Therapy. The tracings were carried out on pre and post lateral cephalograms and checked for following parameters.

1. SNA ANGLE
2. SNB ANGLE
3. ANB ANGLE
4. U1-SN ANGLE
5. UI-ANS-PNS (mm)
6. U6-ANS-PNS (mm)
7. LI-GO-ME ANGLE
8. L1-GO- ME (mm)
9. L6-GO-ME(mm)
10. OP-SN ANGLE
11. FHMP ANGLE
12. MAXILLARY LENGTH
13. MANDIBULAR LENGTH

Difference between cephalometric pre-treatment and post treatments was statistically analyzed using students paired t test .The significance of p value was determined.



Fig No 1. Pre-treatment and post treatment photographs.

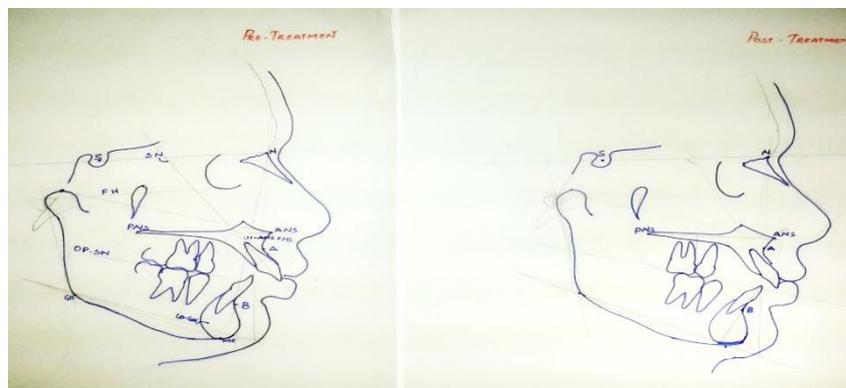


Fig No 2. Pre and post cephalogram tracings

TABLE-I

Sr	SNA	SNB	ANB	U1-SN	UI ANS	U6 AN-	LO GO	LI-GO ME	L6-GO ME	OP- SN	FHMP	MAX	MAND
1	75	71	4	113	27	22	75	40	31	23	32	86	102
2	84	78	6	101	28	32	76	39	31	18	28	92	109
3	82	77	5	104	26	22	62	39	31	26	25	88	104
4	80	76	4	105	29	24	79	42	34	14	26	88	108
5	84	80	4	110	29	24	78	37	31	18	27	92	114
6	84	80	4	113	29	22	84	39	30	15	28	85	112
7	84	80	4	114	26	19	66	39	36	18	30	88	116
8	82	78	4	115	26	24	75	39	31	18	29	90	106
9	83	79	4	102	26	24	75	40	31	19	27	86	105
10	84	80	4	116	27	24	62	42	34	20	26	89	104
11	79	76	3	114	29	21	83	38	30	19	28	88	105
12	83	79	4	114	26	22	67	40	30	15	28	92	109
MEAN	82	77.83	4.17	110.08	27.33	23.33	73.50	39.50	31.67	18.58	27.83	88.67	107.83

TABLE-2

		MEAN	S.D.	P value
SNA	PRE	81.66	2.46	0.747
	POST	82	2.64	
SNB	PRE	75.60	2.09	0.032
	POST	77.8	2.51	
ANB	PRE	6.0	0.20	0.0
	POST	4.1	0.20	
U1-SN1	PRE	114.4	7.76	0.120
	POST	110.0	5.27	
U1-ANS -PNS	PRE	25.0	27.3	0.99
	POST	25.1	1.30	
U6-ANS-PNS	PRE	21.58	2.01	0.110
	POST	23.33	3.00	
L1-GO-ME	PRE	38.75	1.16	0.164
	POST	39.50	1.38	
L6-GO-ME	PRE	29.83	2.15	0.036
	POST	31.66	1.84	

OP-SN	PRE	21.16	2.33	0.036
	POST	18.58	3.22	
FH-MP	PRE	25.58	1.80	0.036
	POST	27.83	1.81	
MAX-LENGTH	PRE	86.83	2.22	0.037
	POST	88.83	2.19	
MAND-LENGTH	PRE	103.9	4.27	0.031
	POST	107.8	4.15	

IV. Results

SNA Angle- Pre and Post mean value is 81.6& 82.0 and S.D is ± 2.46 , ± 2.64 respectively. When compared applying paired t-test, p value of 0.747 was found which was statistically insignificant.

Maxillary Length- Pre and Post mean value is 86.8& 88.80, and S.D is ± 2.22 , ± 2.19 respectively. When compared applying paired t-test, p value of 0.037 was found which is statistically significant.

Studies carried by Antanas showed negative changes with maxillary position denoted by SNA which indicates restrain of the maxilla with Twin block. In our study maxillary length when compared showed significant changes indicating growth of the maxilla was taking place as all the subjects were in growing phase. SNA angle showed positive changes but when compared statistically the results were insignificant indicating that there was headgear effect of Twin block appliance on Maxilla.

SNB Angle- Pre and Post mean value is 75.6& 77.0 and S.D is ± 2.09 , ± 2.51 respectively. When compared applying paired t-test, p value of 0.032 was found which is statistically significant.

Mandibular Length- Pre and Post mean value is 103.9& 107.8 and S.D is ± 4.27 , ± 4.15 respectively. When compared applying paired t-test, p value of 0.031 was found which was statistically significant.

The significant results found in this study indicate that there was a positional as well as changes in the mandibular length.

ANB Angle- Pre and Post mean value is 6.0& 4.16, and S.D is ± 0.7 , ± 0.6 respectively. When compared applying paired t-test, p value of 0.00 was found which is statistically significant.

The significant changes found in this angle indicate that there is correction of the jaw discrepancy in growing Class II cases treated with Twin Block.

U1-SN Angle- Pre and Post mean value is 114.4& 110.0 and S.D is ± 7.76 , ± 5.27 respectively. When compared applying paired t-test, p value of 0.120 was found which is statistically insignificant.

This angles shows that there was no angular change found in maxillary incisors with the appliance.

U1-ANS-PNS - Pre and Post mean value is 25.0& 25.1, and S.D is ± 2.3 , ± 1.30 respectively. When compared applying paired t-test, p value of 0.99 was found which is statistically insignificant.

U6-ANS-PNS- Pre and Post mean value is 21.58& 23.3 and S.D is ± 2.0 , ± 3.0 respectively. When compared applying paired t-test, p value of 0.11 was found which is statistically insignificant.

These measurements showed that Twin Block do not lead to any intrusion of the maxillary incisors or molars.

L1-GO-ME Angle- Pre and Post mean value is 77.8& 73.5 and S.D is ± 7.34 , ± 7.22 respectively. When compared applying paired t-test p value of 0.16 was found which is statistically insignificant.

L1-GO-ME(mm)- Pre and Post mean value is 38.75 & 39.50 and S.D is ± 1.16 , ± 1.38 respectively. When compared applying paired t-test, p value of 0.164 was found which is statistically insignificant.

No changes in lower incisor angulation or inclination were found with Twin Block therapy.

L6-GO-ME(mm)- Pre and Post mean value is 29.83& 31.66 and S.D is ± 2.15 , ± 1.84 respectively. When compared applying paired t-test, p value of 0.036 was found which is statistically significant. There was significant extrusion seen with lower molars along with the therapy. This may result in opening of the bite as well as straightening of the curve of spee.

OP-SN Angle- Pre and Post mean value is 21.16&18.58 and S.D is ± 2.33 , ± 3.22 respectively. When compared applying paired t-test, p value of 0.036 was found which is statistically significant.

FH-MP Angle- Pre and Post mean value is 25.5& 27.8 and S.D is ± 1.8 , ± 1.81 respectively. When compared applying paired t-test p value of 0.006 was found which is statistically significant.

Both these angle showed significant changes indicating growth been redirected in vertical pattern leading to opening of the bite

V. Discussion

The most required result of Twin block is a supplementary lengthening of the mandible by stimulating the growth at the condylar cartilage and restriction of the growth of the maxilla.

In our study results reveal significant lengthening of the mandible when the length was measured from Gonion to (3.8 mm) and changes in SNB angle of (2.2°). Even though the changes in mandibular length is due to mandibular growth or repositioning of the mandible cannot be confirmed with this study. Antanas in his study

also found similar results when mandibular length measured from Ar-Pog was compared pre and post. The results were also in accordance with the results of Lund & Sandler⁹ and Toth&McNamara. Also maxillary restriction was seen as changes in SNA angle were not satisfactory (0.4⁰). These findings were similar to the findings of Antanas¹. No proclination was seen with lower anteriors in our study where as in Antanas¹ study proclination of lower incisors of 3.2⁰ was seen. Lower molars showed eruption which was significant (0.036⁰) which again were similar to the findings of Antanas¹.

Changes in the face were found in the study showing more vertical redirection of growth leading to opening of the SN-OP and FH-MP angle. These results were in accordance to the results found by RituDuggal et al and Sharma et al.

VI. Summary & Conclusion

The results found in these studies suggest that:

Twin Block has a headgear effect on maxilla along with its growth acceleration effect on mandible which leads to rapid changes in ANB angle. These changes bring about desirable correction in jaws leading to a change from convex to a more straight profile.

Twin block appliance leads to more clockwise rotation of both maxilla and mandible and also leads to eruption of the lower molar this indicates that the appliance has to be cautiously used in vertical growers.

Thus in present study conclusive evidence of skeletal, dento- alveolar changes leading to correction of class II div 1 malocclusion with Twin block , a functional appliance, has been established. However long term follow up and studies are recommended with larger sample size.

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