Research Paper

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Anterior Deep Overbite in Angle's Class Ii Division-1 and Angles Class Ii Division- 2— a Dentoalveolar and Skeletal Evaluation

Medical Science

KEYWORDS : cephalometrics, dento-alveolar, deep overbite , Angle's class-II

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ABSTRACT

Diagnosis is the most critical part of Orthodontic treatment. Angle's classification evalutes malrelationship of the arches in saggital plane but the abnormalities in vertical plane are not considered by him. The vertical abnormalities like deepbite and openbite are a challenge to the orthodontic clinician. The deep overbite can be dentoalveolar in origin or skeletal due to growth pattern of jaws. So it is important to study the type of deepbite in a given case.As deepbite is common in class II cases, this study is carried out to study dentoskeletal pattern of deepbite of two types Angle's class II div. 1 and class II div. 2 cases compared with normal subjects using cephalometric analysis.It was concluded that there is more horizontal growth pattern in class II div. 2 cases hence hence the deepbite is more severe in class II div.2 cases compared to div.1 cases.

INTRODUCTION

The proper diagnosis of an orthodontic case is very important. Amongst the large number of diagnostic aids available, the introduction of radiolographic cephalometrics, provided a new field of investigation for gaining the knowledge of complexities of dentofacial skeleton. The greatest value of cephalometrics however is in the field of comparative studies of one type of dentofacial skeleton pattern with another.

Angle's classification denotes malrelationship of the arches antero-posteriorly but there was no provision made for assessing vertical abnormalities. In the past, much attention has been given to the diagnosis, treatment planning and mechanotherapy of anteroposterior malrelationships of dental arches. However, vertical anomalies were largely disregarded, though common.

According to T.M. Graber the term "overbite" applies to the distance by which the maxillary incisal margin closes vertically past the mandibular in occlusion. Deep overbites can be divided into those that are dentoalveolar in origin and those that are predominantly skeletal due to the growth patterns of the jaws. The treatment and prognosis of both the type of deep overbite are different. Hence it is very important to study the type of deep bite in any given case. Since deep bite is very commonly -found amongst class II cases, an attempt to understand the dentofacial skeletal pattern of the deep overbite of the two types of deformities (Angle's Class 11 div-2 and Angle's Class-II Div-l), this study has been carried out taking various subjects having normal occlusion, Angle's Class II div-1 and Angle's Class II div-2 type of malocclusion.

The aim's of this Study are as follows-

1) To study the dentofacial skeletal pattern of the deep overbite of subjects having Angle's Class II div-l malocclusion.,
2) To study the dento-facial skeletal pattern of deep overbite of subjects having Angle's Class II div-2 malocclusion
3) To compare the dentofacial skeletal pattern of these subjects with each other and with the subjects having normal occlusion of teeth.

MATERIAL AND METHODS

The study sample consisted of 60 subjects, 20 of normal occlusion, 20 with Angle's Class-II Div.1 with deep overbite and 20 having Class-II div.2 malocclusion.

The other criteria -for- the selection of subjects are as under :

1) No previous history of any kind of orthodontic intervention.
2) No history o-f any accidental injury to face.
3) All permanent teeth up to second permanent molar were present.
4) The age ranged between 13 to I8 yrs.
5) The male female ratio was 1:1.
6) In all the subjects, the molar relations were same on both the sides of arches i.e. no subdivision was present.
7) In all class-2 cases, the lower incisors were almost fully covered by upper incisors clinically.
8) All the subjects were free -from proximal carious lesions and proximal restorations.
9) No overretained deciduous teeth were present.
10) There was no evidence of supernumerary tooth or teeth.

After the sample selection ,lateral cephalometric radiographs of all the 60 subjects were taken. All subjects were attending the Orthodontic clinic of Govt. Dental College & Hospital, Ahmedabad.

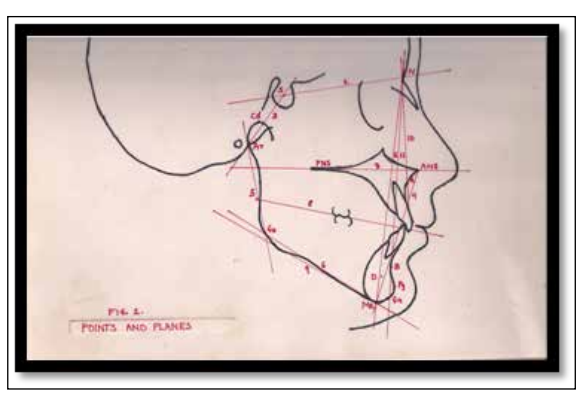
METHOD

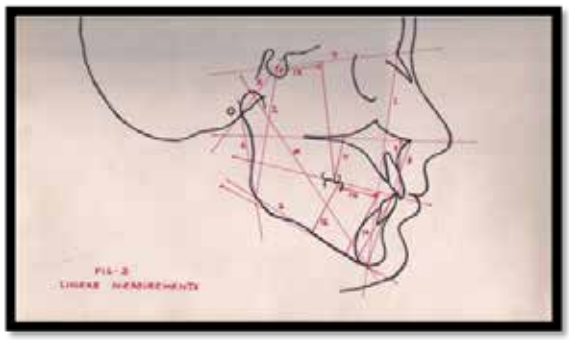
Standard lateral cephalograms were taken with teeth in centric occlusion* The standardized profile radiographic technique using a cephalostat was followed.

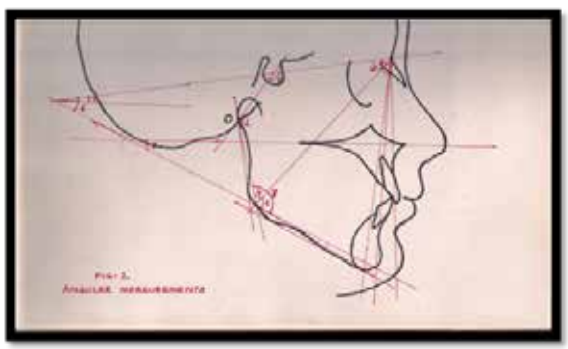
All exposed films were developed and fixed under standardized conditions to achieve uniformity. All the cephalograms were traced using standardized technique of an illuminated tracing table. in cases of discrepancy, the mean shadow of bilateral structures was traced in order to minimize slight errors in head positioning and skeletal or dental assymmetry. All the linear and angular measurements were made to the nearest 0.5mm and 0.5° respectively. To avoid error, each cephalogram was traced twice for the person, at an interval of 2 weeks.

CEPHALQMETRIC POINTS, ANGULAR AND LINEAR MEASUREMENTS

The following cephalometric points, and linear measurements were measured in thestudy.







CEPHALOMETRC POINTS

(1) S (SELLA) The midpoint of hypophyseal fossa. It is a constructed point in the median plane. The centre of sella turcica
(2) N (NASION) The most anterior point of the -frontonasal suture in the median plane
(3) ANS (ANTERIOR NASAL SPINE) Point ANS is the tip of the bony anterior nasal spine in the median plane.
(4) ME (MENTON) According to Krogman & Sassauni , menton is the candal point in the outline of the symphysis, it is regarded as the lowest point of the mandible
(5) GO (GONION) A constructed point the intersection of the lines tangent to the post margin of the ascending ramus and the mandibular base.
(6) Ar.(ARTICULARE) The point of the intersection of the posterior margin of ascending ramus and the outer margin o-f the cranial base
(7) Cd (CONDYLION) Most superior point on the head of condyle.
(8) Pog (POGONION) Most anterior point of the bony chin, in the median plane.
(9) Gn (GNATHION) The most anterior and inferior point on the bony chin.
(10) PNS (POSTERIOR NASAL SPINE) This is a constructed radiological point, the intersection of a continuation of the anterior wall of the pterygopalatine fossa and the floor of the nose?. It marks the dorsal limit of maxilla.

LINES

(1) S -N (SELLA - NASION) Anteroposterior extent of anterior cranial base formed by line connecting points S and N.
(2) N-Me Line connecting the points N and Me representing the anterior face height
(3) S-Ar Line connecting points S and Ar, representing posterior extent of cranial base.
(4) ANS – Me (LOWER ANTERIOR FACE HEIGHT) Line connecting points ANS and Me, representing the lower anterior facial height.
(5) Ar-Go Line connecting points Ar and Go representing length of the ramus.
(6) Go-Me Line connecting points Me and Go, representing the extent of mandibular base
(7) PALATAL PLANE Line connecting ANS and PNS representing palatal plane.
(8) OCCLUSAL PLANE A line connecting the midpoint in the incisor overbite in occlusion and the most distal point of contact between the most posterior molars in occlusion.
(9) MANDIBULAR PLANE A line which is tangential to the lower border of mandible.

(1) N-S-Ar Saddle angle between the anterior (N-S) and posterior (N~S) and posterior (5-Ar) cranial base.
(2) S-Ar-Go Artcular angle formed between the S-ar line and the Ar-Go line.
(3) Ar-Go-Me Gonial angle formed between the ramus and the body of mandible base.
(4) Go1 (N-Ar-Go) Upper gonial angle formed by the ascending ramus and the line joining
(5) Go2 (N-Go-Me) Lower gonial angle, formed by the body of mardible and the line joining nasion-gonion.
(6) GoGn-SN) Angle between Go Gn Plane and the SN Line.
(7) Pal-SN Angle between the palatal plane and the SN line.

ANGUL ANGULAR MEASUREMENTS
LINEAR MEASUREMENTS
RATIO

(1) AFH Anterior face height, linear distance between point N to point me.
(2) PFH Posterior face height, linear distance between point S to point Go.
(3) LFH Lower face height, linear distance between point ANS to point me.
(4) SN Anterior cranial base, linear distance between point N and Point S.
(5) S-Ar Posterior cranial base, linear distance between point S and point Ar.
(6) Ar-Go Length of the ramus linear distance between point Ar and point Go.
(7) Go-Me The extent of mandibular base, linear distance between point Go and Me.
(8) Cd-Me Effective mandibular length measured from point Cd to point me.
(9) UIH Upper incisor height-linear perpendicular distance from maxillary central incisor tip to palatal plane
(10) LIM Lower incisor height-linear distance from the mandibular central incisor tip to the mandibular plane, measured perpendicular to the mandibular plane.
(11) UMH Upper molar height-linear distance between tip of the mesiobuccal cusp of the maxillary first molar and the palatal plane measured perpendicular to the occlusal plane.
(12) LMH Lower molar height-linear distance between the tip Of the mesiobuccal cusp of the mandibular first molar and the mandibular plane measured perpendicular to the mandibular plan
(13)UM-AP Horizontal linear distance of mesiobuccal cusp tip of upper first molar from sella along SN plane.
(14)LM-AP Perpendicular distance from tip of mesiobuccal cusp of lower first permanent molar to a line drawn perpendicular to GoGn plane and tangent to the lingual border of symphysis.

RATIO

(1) PFH/AFH RATIO Obtained by dividing the posterior face (JARABAK RATIO) height by anterior face height and the resultant multiplied by 100.

TABLE 1 SHOWING MEAN AND S.D. OF ANGULAR SKELETALMEASUREMENTS.

SR. NO.		NORMAL (A)		CL.II DIV.1 (B)		CL.11 DIV.2(C)	
		MEAN (N=20)	S.D.	MEAN (N=20)	S.D.	MEAN (N=20)	S.D.
1	< N-S-Ar	129.05	4.382	132.15	3.28	128.15	3.759
2	< S – Ar – Go	138.05	6.605	137.04	4.84	141.00	4.823
3	< Ar – Go – Me	120.09	6.077	125.015	4.81	115.45	5.529
4	< Go1	052.45	4.751	055.01	3.51	51.70	4.461
5	< Go2	068.55	4.442	070.04	3.101	63.85	3.391

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6	< GoGn-SN	030.02	2.705	031.05	2.910	23.50	3.389
7	< PaL-SN	010.03	2.536	009.04	2.60	8.05	1.820
8	< PAL-GoG	019.09	4.426	022.01	4.689	15.45	3.074
9	< SNA	081.05	2.125	079.33	2.52	83.05	2.154
10	< SNB	079.15	2.907	071.91	2.198	76.25	2.679
11	< ANB	002.04	3.235	007.42	3.861	07.00	3.867
12	< SND	076.08	3.620	069.05	3.772	73.87	3.969

TABLE 2 : SHOWING MEAN AND S.D. OF LINEAR SKELETAL

SR. NO.		NORMAL		CL.II DIV.1		CL.11 DIV.2	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
1	AFH	117.00	5.821	112.04	5.566	111.4	5.59
2	LAFH	62.05	3.620	58.08	4.640	57.0	3.395
3	PFH	80.07	5.876	72.04	4.392	83.7	6.74
4	JARABAKS RATIO	69.45	5.532	45.04	3.511	75.55	3.945
5	Cd-Me	114.35	5.353	103.75	6.504	109.35	4.625
6	NS	71.75	2.048	70.65	2.433	71.4	3.507
7	SAr	36.04	3.076	34.08	2.607	39.75	3.931
8	Ar-Go	49.05	5.784	41.06	3.858	49.2	4.774
9	Go-Me	73.04	2.234	67.75	4.024	72.55	3.051

TABLE 3 : SHOWING MEAN AND S.D. OF LINEAR DENTAL MEASUREMENTS.

SR. NO.		NORMAL		CL.II DIV.1		CL.11 DIV.2	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
1	Ui - Ht	24.03	3.972	26.1	1.552	27.5	2.212
2	Li - Ht	43.07	3.645	43.75	3.921	40.65	2.286
3	Um - Ht	22.05	2.874	20.5	1.866	19.7	1.335
4	Lm - Ht	33.25	2.899	34.15	3.790	30.95	3.587
5	Um - AP	34.04	5.154	29.9	1.682	32.7	4.053
6	Lm - AP	15.65	2.277	17.55	1.986	17.8	2.858

TABLE 4 : SHOWING COMPARISON OF ANGULAR MEASURMENTS BETWEEN VARIOUS GROUPS BY "UNPAIRED t" TEST

SR. NO.		GROUP A & B N1 + N2 = 40		GROUP A & C N1 + N2 = 40		GROUP B & C N1 + N2 = 40	
		"t" VALUE	SIGNI FICANCE	"t" VALUE	SIGNI FICANCE	"t" VALUE	SIGNI FICANCE
1	< N-S-Ar	-2.165	*	0.890	NS	3.406	**
2	< S – Ar – Go	0.599	NS	-1.367	NS	-2.348	**
3	< Ar – Go – Me	-2.452	*	2.966	**	5.919	**
4	< Go1	-1.799	NS	0.514	NS	2.442	*
5	< Go2	-1.527	NS	3.761	**	6.374	**
6	< GoGn-SN	1.108	NS	3.223	**	1.902	NS
7	< PaL-SN	-1.463	NS	6.922	**	8.022	**
8	< PAL-GoG	-2.586	*	+2.654	*	3.114	**
9	< SNA	+1.729	NS	-1.052	NS	1.529	NS
10	< SNB	53900	**	2.620	*	1.210	*
11	< ANB	-3.601	**	-3.922	**	0.119	NS
12	< SND	4.125	**	2.110	*	-1.999	*

GROUP A = NORMAL OCCLSION
GROUP B = CLASS II DIV. 1
GROUP C = CLASS II DIV. 2
NS = NON SIGNIFICANT
DEGREE OF FREEDOM = 38

TABLE 5 : SHOWING COMPARISON OF LINEAR SKELETAL MEASUREMENTS BETWEEN VARIOUS GROUPS BY UNPAIRED t

SR. NO.		Group A & B N1 + N2 = 40		GROUP A & C N1 + N2 = 40		GROUP B & C N1 + N2 = 40	
		"t" VALUE	SIGNI FICANCE	"t" VALUE	SIGNI FICANCE	"t" VALUE	SIGNI FICANCE
1	AFH	3.109	**	2.564	-0.570	-0.570	NS
2	LAFH	2.811	**	5.406	1.789	1.789	NS
3	PFH	5.059	**	-1.500	-6.281	-6.281	**
4	JARABAKS RATIO	2.733	**	-4.281	-8.900	-8.900	**
5	Cd-Me	5.627	**	3.160	-3.138	-.138	**
6	NS	1.546	NS	0.165	-1.309	-1.309	NS
7	SAr	1.220	NS	-3.499	-4.693	-4.693	**
8	Ar-Go	5.092	**	0.189	-5.537	-5.537	**
9	Go-Me	4.894	**	0.854	-4.250	-4.250	**

GROUP A = NORMAL OCCLSION
GROUP B = CLASS II DIV. 1
GROUP C = CLASS II DIV. 2
NS = NON SIGNIFICANT
DEGREE OF FREEDOM = 38

TABLE 6 : COMPARISON OF LINEAR DENTAL MEASUREMENTS
BETWEEN VARIOUS GROUPS BY "UNPAIRED t" TEST

SR. NO.		GROUP A & B		GROUP A & C		GROUP B & C	
		"t" VALUE	SIGNI FICANCE	"t" VALUE	SIGNI FICANCE	"t" VALUE	SIGNI FICANCE
1	Ui - Ht	-0.209	NS	-1.573	NS	-2.317	*
2	Li - Ht	-2.547	*	-3.222	**	-0.492	NS
3	Um - Ht	3.067	**	2.469	*	-1.169	NS
4	Lm - Ht	0.284	NS	-0.872	NS	-1.028	NS
5	Um - AP	3.711	**	1.159	NS	-2.853	**
6	Lm - AP	-2.516	*	-2.386	**	-0.321	NS

GROUP A = NORMAL OCCLSION
GROUP B = CLASS II DIV. 1
GROUP C = CLASS II DIV. 2
NS = NON SIGNIFICANT
DEGREE OF FREEDOM = 38

CONCLUSION

(1) The mandible is posteriorly positioned in Class-Il div.1 cases as compared to Class—II div.2 and normal cases.
(2) The lower gonial angle was significantly smaller in class-II div.2 suggestive of horizontal growth pattern.
(3) The anterior face height is smaller in Class-II cases than normal and still smaller in Class-II div.2 cases as compared to CI ass-11 div.1.
(4) The posterior -Face height is larger in Class-H div.2 cases as compared to normal and Class-II dlv.1 cases, which gives rise to larger Jarabac's ratio in Class-II div.2 cases. This is suggestive of more horizontal growth pattern in Class-II div.2 cases and hence the deep overbite is mare severe.
(5) The lower anterior facial height is smaller in Class-li div.2 as compared to Class-II div.l cases.
(6) The effective mandibular length is smaller in Class-H div.i cases as compared to Class-11 div.2 cases,
(7) The ramus height is smaller in Class-II div.l than in Classic div.2 cases.
(8) The length of posterior cranial base is greater in Class-II div.2 than in Class-II div.l cases.
(9) The length of the body of mandible is smaller in Class-II div.i than in div.2 cases.
(10) The lower incisor height is greater in Class-H cases but there is no significant difference between the div.i and div.2 groups.

(11) The upper molar height is smaller in Class-II cases than normal. The lower Thus based on this study the -following conclusions were made : molar height is smaller in Class-lI div.2 cases than div.l and normal cases.

(12) The maxillary first permanent molar is placed posteriorly in Class-II div.l than in div.2 and normal cases.

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