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Soft Tissue Profile Changes Following Treatment with All Four First Premolars in Bimaxillary Protrusion Cases – Research Article

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Abstract:
Aim: *To evaluate soft tissue,skeletal and dental changes following fixed mechanotherapy in bimaxillary protrusion cases treated with all four first premolars extractions..*
Materials And Methods: *The Study was conducted on 20 patients (8 males and 12 females) age ranging from 13- 20 years.All of them were treated with 1st premolar extracted followed by retraction of the upper and lower anteriors with fixed orthodontic mechanotherapy.*
Results: *Pre treatment and post treatment cephalometric parameters were measured and recorded.,Statistically significant changes were noted in Upper incisor to NA both angular and linearmeasurements,Upper incisor to SN plane angle ,Lower incisor to NB angular and linear measurements , Lower incisor to mandibularplane ,E plane to lower and upper lip.11degree changes were seen in Upper incisor to NA angle and 4mm increases in Upper incisor to NA linear.9 degree changes were seen in Lower incisor toNB angle and 4 mm increases in Lower incisor to NB linear.Nasolabial angle is decreased by 7mm.E plane to lower lip decreased by 3mm and E plane to upper lip showed not much changes.*

I. Introduction :

Bimaxillary protrusion is defined as proclination of upper and lower anteriors along with increased procumbency of the upper and lower lips.Since it is associated with incompetent upper and lower lips ,patients seekorthodontic treatment hence favourable changes in the facial soft tissues are desirable following fixed orthodontic treatment.Firstpremolar extraction is preferred in bimaxillary protrusion cases because it reduces incisor proclination enabling lip competence and there by improving soft tissue profile.

Over retraction of anterior teeth following first premolar flattens the face and produces a dished in profile. It is very important to evaluate soft tissue changes produced by fixed orthodontic mechanotherapy in bimaxillary protrusion cases treated with first premolar extraction.Various studies have reported a high degree of correlation between upper incisor and lip retraction but a few studies concluded that there is no definite change in soft tissue following retraction of anterior teeth.

This study is aimed at measuring and analysing the amount of soft tissue change following retraction of upper and lower incisors.

II. Methodology:

In this study, 20 patients (8 males and 12 females) with class 1 skeletal malocclusions and bi maxillary dental proclination were selected and treated with fixed orthodontic appliances.All the patients were between 13-20 yrsat the beginning of treatment.All patients were treated with MBT 022 prescription straight wire fixed appliances . The treatment objectives were to ideally align the incisor,correct the incisor inclination close the premolar extraction spaces and provide an esthetically pleasing profile.

III. Inclusioncriteria:

Patients with class1 bimaxillary dental protrusion requiring first four premolars extractions
Age range 13 to 20 yrs
Good periodontal health
No systemic diseases.

IV. Exclusion Criteria:

Malocclusions other than class 1 bimaxillary protrusion
Non extraction cases
Periodontally compromised
No functional appliance or orthognathic surgical procedure
No congenitally missing teeth.

The dental,skeletal and soft tissue measurements were investigated using pre and post treatment lateral cephalometric tracings exposed at the beginning and end of the treatment.All radiographs were taken in standing position with the horizontal plane parallel to the floor , the dentition in centric occlusion and the lips relaxed.

Standardized cephalometric radiographs measuring 8" 10" were taken using sirona cephalostat with settings of 14mA and 77 Kvp and exposure time was 4.7 seconds.

V. Parameter Measured:

The skeletal angular parameters measured with pre and post treatment lateral cephalogram tracings were done to verify the skeletal contribution to the bi maxillary protrusion cases .The parameter used in this study are SNA Angle, SNB Angle, ANB Angle, GoGn to SN, Ul to NA angle, Ul to NA linear, Ul to SN angle, Ll to NB angle, Ll to NB linear, Ll to man plane, Interincisal angle, S plane to upper lip, S plane to lower lip, Nasolabial angle, E plane to upper lip and E plane to lower lip.

VI. Statistical Method:

Mean and standard deviation was calculated,Paired sample T test was used to compare the pre and post treatment values.

VII. Results:

Pre and post treatment skeletal measurements:

The skeletal cephalometric parameter for the maxilla (SNA) after treatment had reduced by 1.5 degree but there was no significant change in SNB angle.

Pre and post treatment dental measurements:

Post treatment dental cephalometric parameters for the maxillary incisors (UI to SNA linear and angular) showed a significant reduction of approximately 10 degree and 4 mm.Also UI to SN angle had reduced by 15 degree post treatment.Post treatment dental cephalometric parameters for the lower incisors (LI to NB angular and linear) showed a significant reduction of 8.9 degree and 3.5 mm.It also showed significant change of approximately 7.5 mm in LI to mandibular plane .

Pre and post treatment angular soft tissue measurements:

Nasolabial angle showed a significant post treatment increase of 7 degrees.

Pretreatment and post treatment linear soft tissue measurements:

Linear soft tissue parameter for upper lip (E plane to upper lip) showed significant post treatment decrease of 2 mm and linear soft tissue parameter for lower lip (E plane to lower lip) showed significant decrease of 3mm.

Table -1 Pre treatment and post treatment cephalometric analysis

Variable	Treatment	N	Mean	Std. Dev	t-Value	P-Value
SNA Angle:	Pre treatment	20	82.55	2.605	3.142	0.005
	Post treatment	20	81.10	1.714		
SNB Angle:	Pre treatment	20	78.65	2.601	1.470	0.158
	Post treatment	20	77.95	1.820		
ANB Angle:	Pre treatment	20	4.00	2.449	2.979	0.008
	Post treatment	20	2.90	1.447		
GoGn to SN:	Pre treatment	20	34.45	3.103	2.540	0.020
	Post treatment	20	33.40	2.854		
Ul to NA angle:	Pre treatment	20	35.75	5.812	7.595	<0.001
	Post treatment	20	23.95	4.524		
Ul to NA linear:	Pre treatment	20	8.30	3.011	6.622	<0.001
	Post treatment	20	4.40	.940		
Ul to SN angle:	Pre treatment	20	119.15	6.722	8.357	<0.001
	Post treatment	20	104.80	3.778		

Variable	Treatment	N	Mean	Std. Dev	t-Value	P-Value
Ll to NB angle:	Pre treatment	20	36.45	4.298	8.902	<0.001
	Post treatment	20	27.55	5.031		
Ll to NB linear:	Pre treatment	20	8.75	1.832	8.722	<0.001
	Post treatment	20	5.20	1.196		
Ll to man plane:	Pre treatment	20	102.75	6.112	6.004	<0.001
	Post treatment	20	95.20	4.786		
Interincisal angle:	Pre treatment	20	107.75	10.269	3.643	0.002
	Post treatment	20	120.95	10.570		
S plane to upper lip:	Pre treatment	20	.50	3.502	0.679	0.505
	Post treatment	20	.20	2.331		
S plane to lower lip:	Pre treatment	20	.80	4.652	0.096	0.924
	Post treatment	20	.75	3.210		
Nasolabial angle:	Pre treatment	20	92.25	15.444	3.126	0.006
	Post treatment	20	99.30	11.757		
E plane to upper lip:	Pre treatment	20	-.85	1.531	7.844	<0.001
	Post treatment	20	1.30	1.490		
E plane to lower lip:	Pre treatment	20	-5.00	2.224	8.623	<0.001
	Post treatment	20	-2.00	1.835		

VIII. Discussion:

Bimaxillary protrusion is always associated with proclined upper and lower anteriors andincrease lip prominence.[1,2] All four first premolars extraction followed by retraction of the anteriors is the treatment of choice for bimaxillary protrusion [3,4].Several studies have been carried out in the past to forecast soft tissue changes followed by treatment with first premolar extraction in bimaxillary protrusion cases.These studies are aimed to help the clinician in making extraction decisions.

In present study all patients presented with chief complaint of prominent protruded incisors and lips.Pre treatment cephalometric analysis of the patients confirmed bimaxillary protrusion . In post treatment radiographs soft tissue profile and associated dental and skeletal anteroposterior changes were recorded and assessed. Anteroposterior incisor inclination showed significant changes.Upper incisor angulation had reduced on an average of 12 degrees and 4 mm post treatment , also maxillary skeletal changes measured by SNA were also significant.Mandibular incisors inclination reduced by 9 degrees and 3.5 mm . These changes are in accordance various other studies which noted similar results.There were no significant changes in vertical measurements post treatment unlike coated in the study by HR SUKHIA[5].

In our study both upper and lower lip showed significant linear and angular changes.Linear changes were assessed by rickett's E plane.Upper lip had retracted by an average of 2mm and lower lip had retracted by an average of 3 mm post treatment.But the S plane to upper and lower lip had not shown any statistically significant changes . Angular lip measurement were determined with the changes in nasolabial angle after the treatment.Nasolabial angle showed a significant change of 7 degrees post treatment, which implies that upper lip had fallen back reducing lip prominence.

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