Research Article **IJDRR (2019) 2:15**

International Journal of Dental Research and Reviews
(ISSN:2637-3750)

Soft Tissue Cephalometric Changes in Class I Patients Treated with Extraction and Non Extraction Modalities

Jeevan kumar.M[1], Anoosha.M[2], Padma priya .C.V[3], Praveen kumar varma .D[4], Goutham chakravarthy.v[5]

[1.] Post graduate student from the department of orthodontics, Vishnu dental college, bhimavaram.
[2.] Senior lecturer from the department of orthodontics, Vishnu dental college, bhimavaram.
[3.] Professor and head from the department of orthodontics, Vishnu dental college, bhimavaram.
[4.] Professor from the department of orthodontics, Vishnu dental college, bhimavaram.
[5.] Professor from the department of orthodontics, Vishnu dental college, bhimavaram.

ABSTRACT

Background : Extractions are frequently used to treat crowding, protrusion of teeth and the soft tissue covering. The common consequences of extraction therapy were believed to be “dished-in profiles”, constriction of dental arch, and increased width of the buccal corridor space, whereas non extraction treatment results in poor stability and protrusive profile in borderline cases. **Aim:** Aim of the present study was to compare the cephalometric soft tissue changes between Class I malocclusion patients who were treated with first premolar extractions and Class I malocclusion patients who were treated with non extraction with similar appliances. **Methods and Material:** It is a retrospective study were the treatment records of 50 (25: extraction and 25: non extraction) orthodontic patients with Angles and skeletal Class I malocclusion of age between 13-30 years were randomly selected. Both pre and post treatment lateral cephalograms were traced manually and soft tissue changes were measured and analyzed between extraction & non- extraction group. **Statistical analysis:** Independent samples t test, Paired-t test. **Results:** Within extraction group, Angle of convexity, Upper lip to e-line, lower lip to e-line, nose prominence and interlabial gap are the parameters which has shown statistically significant(p=.000*)difference after the treatment and within the non extraction group upper lip thickness was the only parameter which has shown statistically significant (p=.005*) difference after the treatment. The remaining parameters have not shown any significant difference
Conclusions: Profile improvement was better with extraction protocol compared to non-extraction therapy. Lip competence was better achieved with extraction therapy Overall the choice of the treatment modality depends on the severity of the problem.

Keywords: Soft tissue changes, extraction, non extraction, borderline cases.

***Correspondence to Author:**
Jeevan kumar.M
Post graduate student from the department of orthodontics, Vishnu dental college, bhimavaram.

How to cite this article:
A. DANIEL and A.O. ADELEYE. Subclinical chronic sinusitis causing presumed ventriculoperitoneal shunt sepsis in a child. International Journal of Dental Research and Reviews, 2019, 2:15

eSciPub LLC, Houston, TX USA.
Website: http://escipub.com/

Introduction:

The impact of fixed orthodontic treatment on the facial profile changes with or without the extraction of premolars has become more interesting[1]. Most of the researchers believed that extraction treatment results in flattening of profile and the lips are known to place more backward in relation to ricketts E-line which gives aged look for an individual[2].

Angle insisted that patients who maintain their full complement of teeth will have superior occlusion and esthetics, but Tweed[3] recognized through cephalometrics that it is impossible to attain balance and facial harmony when treating without extraction.

Borderline cases are those which can be treated with extraction or non-extraction therapy depending on the soft tissue compensation and tooth size arch length discrepancy.

Subjects and Methods:

It is a retrospective study were the treatment records of 50 (25:extraction and 25: non extraction) orthodontic patients with Angles and skeletal Class I malocclusion with the age range of 12-30 years were randomly selected.

The cephalometric parameters were measured for entire sample by manual tracing. It is tough to isolate borderline Class I malocclusions from other extraction and non- extraction individuals based only on particular parameters, predominantly when a large group of sample is to be analyzed. Discriminant analysis is a compound distribution statistical method where many parameters that show impact on treatment modality can be evaluated, and it will also allow us to assess the treatment modality as well as recognizing the borderline patients. Therefore, in present study, a discriminant analysis was carried out to isolate the borderline sample of patients who could have been treated with either extraction of premolars or non extraction treatment modalities. A total of 10 cephalometric parameters, 1 study model measurements, were selected for the discriminant analysis.

Discriminant analysis confirmed that Maxillary tooth size material-arch length discrepancy is the most effective in recognizing extraction and nonextraction groups, followed by upper lip to e-line and mandibular tooth material-arch length discrepancy.

Both pre and post treatment lateral cephalograms were traced manually and soft tissue changes (Angle of convexity, upper lip length, lower lip length, upper lip thickness, upper lip – E line, lower lip – E line, nose prominence, soft tissue chin, interlabial gap) were measured and analyzed in both the groups and intergroup comparison was performed to know the amount of soft tissue changes that has taken place in extraction & non- extraction group.The parameters studied are described in Fig:1&Table:1

Table: 1 The parameters studied are

S.N0	MEASUREMENT	DESCRIPTION
1.	Na–Sn-Pg	Angle of facial convexity
2.	Ls–E-plane	Position of the upper lip in relation to E-plane
3.	LL–E-plane	Position of the lower lip in relation to E-plane
4.	2mm below sub nasale to outer border of upper lip.	Thickness of the upper lip
5.	Sn- ULi	Upper lip length
6.	LLs – Me	Lower lip length
7.	Hard tissue pog to Soft tissue pog	Soft tissue thickness at chin
8.	Tangent from FH plane – outer border of the upper lip	Projection of the nose
9.	ULi-LLs	Interlabial gap

Table: 2 Comparison of Cephalometric soft tissue parameters of extraction group before and after the treatment.

MEASURES	EXTRACTION PRETREATMENT		EXTRACTION POST TREATMENT		P – value
	MEAN	SD	MEAN	SD	
Angle of convexity[Degree]	6.60	2.53	3.20	2.39	.000*
Upper lip-E-line[mm]	2.16	0.82	-1.50	.50	.000*
Lower lip-E-line[mm]	3.50	1.81	-1.05	1.77	.000*
Upper lip thickness[mm]	15.17	2.9	16.70	3.46	.647
Upper lip length[mm]	16.92	2.01	17.28	2.30	.428
Lower lip length[mm]	45.52	4.95	46.84	4.72	.183
Soft tissue chin[mm]	10.24	.42	10.32	2.60	.826
Nose prominence[mm]	10.24	2.10	14.08	2.27	.000*
Interlabial gap[mm]	4.64	2.72	1.84	2.24	.000*

(P, 0.005=statistically significant. SD=standard deviation)

Table: 3 Comparison of Cephalometric soft tissue parameters of Non extraction group before and after the treatment.

MEASURES	NON EXTRACTION PRETREATMENT		NON EXTRACTION POST TREATMENT		P – value
	MEAN	SD	MEAN	SD	
Angle of convexity[Degree]	4.68	3.82	3.28	5.33	.076
Upper lip-E-line[mm]	1.72	2.96	1.64	2.91	.085
Lower lip-E-line[mm]	-.33	3.87	-.54	2.71	.192
Upper lip thickness[mm]	15.70	2.01	16.75	2.22	.005*
Upper lip length[mm]	21.60	3.13	21.44	4.18	.808
Lower lip length[mm]	48.16	5.19	46.48	5.27	.091
Soft tissue chin[mm]	12.08	2.01	11.36	2.43	.095
Nose prominence[mm]	10.72	3.40	11.20	3.94	.486
Interlabial gap	3.20	2.87	3.70	2.58	.591

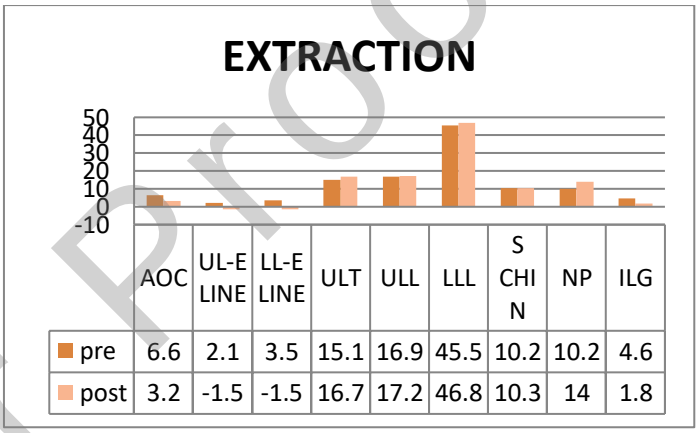
(P, 0.005=statistically significant. SD=standard deviation)

Table: 4 Comparison of Cephalometric soft tissue parameters of Extraction & Non extraction group after the treatment.

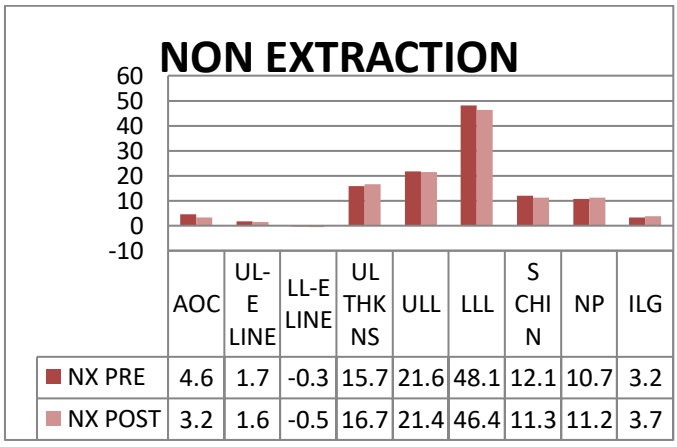
MEASURES	Extraction post treatment		Non extraction post treatment		P – value
	MEAN	SD	MEAN	SD	
Angle of convexity[Degree]	3.20	2.39	3.28	5.33	0.19
Upper lip-E-line[mm]	-1.50	.50	1.64	2.91	0.04*
Lower lip-E-line[mm]	-1.05	1.77	-.54	2.71	0.00*
Upper lip thickness[mm]	16.70	3.46	16.75	2.22	0.92
Upper lip length[mm]	17.28	2.30	21.44	4.18	0.00*
Lower lip length[mm]	46.84	4.72	46.48	5.27	0.81
Soft tissue chin[mm]	10.32	2.60	11.36	2.43	0.09
Nose prominence[mm]	14.08	2.27	11.20	3.94	0.02*
Interlabial gap	1.84	2.24	2.20	2.58	0.05*

(P, 0.005=statistically significant. SD=standard deviation)

Graph 1: Comparison of extraction group before and after the treatment.



Graph 2: Comparison of Non extraction group before and after the treatment



Graph: 3 Comparison of Extraction & Non extraction group after the treatment.

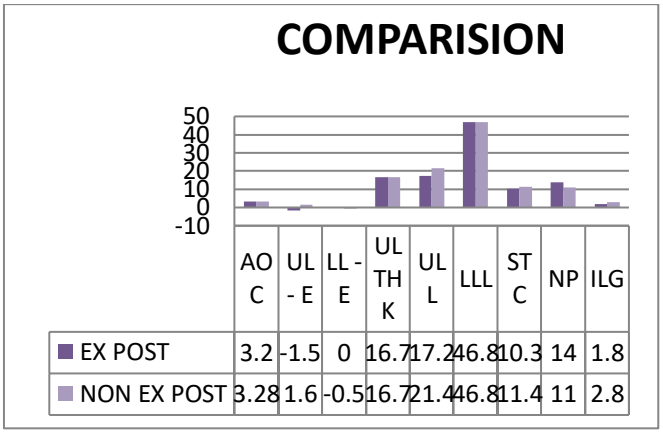
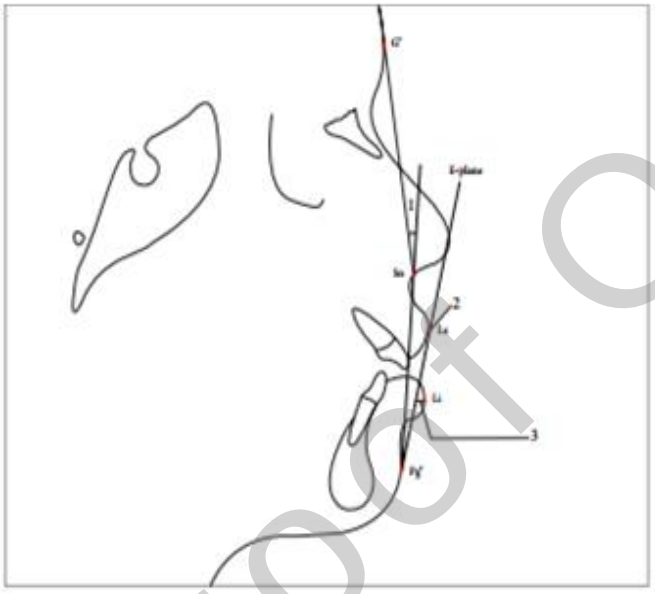


Figure:1 Parameters evaluated



Results:

Independent samples t test was performed to compare the treatment outcome in extraction and non extraction treatment modality.

Paired-t test was performed to assess the pre and post-treatment soft tissue cephalometric changes in extraction and non extraction treatment modality.

Comparative statistics of the borderline extraction and non extraction sample is listed in Tables 1 and 2 respectively.(Graph 1 & 2). Within extraction group Angle of convexity, Upper lip to e-line, lower lip to e-line, nose prominence and interlabial gap are the parameters which has shown statistically significant(p=.000*)difference after the treatment and within the non extraction group upper lip thickness was the only parameter which has shown statistically significant (p=.005*) difference after the treatment. The other parameters did not show statistically significant changes in both the groups.

When extraction group is compared with non extraction group,(Table:3) the parameters such as Upper lip to e-line, lower lip to e-line, upper lip length, nose prominence and interlabial gap has shown statistically significant difference. (Graph 3)

In the present study Upper lip was retracted 3.5mm in relation to E-line in extraction group and in non extraction group it was only 0.8mm, whereas lower lip was retracted 4mm in extraction group and 0.2mm in non extraction group. In extraction group pre treatment Angle of convexity was 6.6^0 and it was decreased to 3.6^0 after the treatment whereas in non extraction group it was decreased from 4.6^0 to 3.2^0. interlabial gap was decreased by 3mm in

extraction and 1mm in nonextraction group, and nose prominence was increased by 4mm in extraction group and 0.05mm in nonextarction group.

Considering the cephalometric soft tissue changes, the borderline sample showed significant amount of difference when treated with both extraction and non extraction therapy.

Discussion:

The main purpose of the present study was to compare the facial profile changes between a sample of patients who were treated with extraction of all first premolars and other sample treated without extraction.

CHANGES IN THE SOFT TISSUE CEPHALOMETRIC PARAMETERS WITH NON-EXTRACTION THERAPY:

In the present study, upper lip to e-line does not show any statistically significant difference between pre and post treatment only 0.1mm of upper lip had retracted and these values are comparable to the study conducted by Kocadareli[4], who reported that Upper lip was retracted only 0.4mm in relation to e-line which was insignificant. Similarly, in the present study lower lip to e-line also does not show any significant difference which was reduced only by 0.5mm and results of the present study were comparable to the study conducted by Finnoy et al[5] and Xu et al[6] who reported that lower lip was retracted only 0.4 mm, and results of the present study were contradictory with a study by Konstantonis[7] et al in his study he stated that the lower lip was protruded 0.67 mm & these may be due to non extraction treatment which made teeth procline.

In the present study upper lip thickness had increased by 1mm after the treatment. It has shown statistically significant difference and these results were comparable with the study conducted by Aniruddh Yashwant et al[8] who stated that upper lip thickness was increased by 1.9mm in nonextraction therapy. Interlabial gap has increased by 0.5mm after the treatment but it does not show any statistically significant change. These may be due to forward tipping of the incisors after treatment in non extraction group which might result in increase the interlabial gap. And similar results were mentioned by a study done by saelens[9] who stated about increase in interlabial gap when treating with non extraction treatment modality.

CHANGES IN THE SOFT TISSUE CEPHALOMETRIC PARAMETERS WITH EXTRACTION THERAPY:

In the present study angle of convexity has shown significant difference after the treatment, i.e. it has been decreased by 3^0 these might be due to retraction of teeth and remodeling of dentoalveolar region. And the results of the present study were comparable with the study conducted by Oliver[10] in his study he mentioned that angle of convexity has significantly reduced in extraction group. When compared pre and post treatment mean values of upper lip to e line, it has been reduced by 3.5mm & lower lip to e line was reduced by 5.0 mm after the treatment, both the parameters had shown significant difference, but lower lip has retracted 1.5mm more than upper lip and similar results were found with a study conducted by Drobocky & Bravo[11, 12] They reported that both upper & lower lips has retracted with the extraction of first premolars because of retraction of anterior teeth on extraction group. Similarly Kocadereli[7] in his study stated that upper & lower lips were retracted by -1.60 mm by extracting the first premolars.

When compared the mean value of nose prominence, significant difference was found between pre and post treatment value which was increased by 4mm after the treatment and this may be due to retraction of incisors and lip made the nose more prominent and the results of the present study were comparable with a study conducted by Paquette & battagel [13, 14] who stated that, with retraction of incisors nose prominence has increased.

In the present study the interlabial gap was reduced by 3 mm in the extraction group and it has shown statistically significant difference. these may be due to retraction of incisors, As previously mentioned lower lip has retracted more which might also contributed in reducing the interlabial gap and the results were similar with a study conducted by yogosawa,[15] he stated that interlabial gap was reduced mainly due to retraction of lower lip. Jacobs& Wholley [16, 17] reported that the decrease in interlabial gap is mainly due to retraction and intrusion of maxillary incisors.

COMPARISON OF THE POST TREATMENT SOFT TISSUE CEPHALOMETRIC PARAMETERS BETWEEN EXTRACTION AND NON-EXTRACTION THERAPY:

In the present study there was significant difference in the angle of convexity, which was reduced by 3^0 in extraction case, whereas in non-extraction group it does not show any significant differencce. When comparing extraction and non extraction groups, extraction group shown more change in angle of convexity. And results were similar with a study of Lim et,al [18]

When compared upper lip to E-line & lower lip to E-line between extraction and non extraction group, extraction group has shown significant difference, this results were comparable with study conducted by ram nanda & ertan,[19] who stated that upper and lower lips was retracted more in extraction group.

Interlabial gap was decreased by 3mm in the extraction group and 1mm in nonextraction group. Extraction group has shown more change in interlabial gap than non extraction group. Luppanapornlarp [20] reported similar results, but Janson et al[21] reported conflicting results, they stated that decrease in interlabial gap was seen in non extraction patients (2.7 mm) than in extraction patients (1.3 mm)

Decrease in the upper lip thickness of 1mm is found in non-extraction group whereas it did not show any change in extraction group.

Similarly, nose prominence was increased by 4mm in extraction group, whereas in non extraction group it did not show any difference.

Conclusion: According to the results obtained from the study it can be concluded that profile improvement was better with extraction protocol when compared to non-extraction therapy and lip competence was better achieved with extraction therapy, Overall the choice of the treatment modality depends on the severity of the problem.

References

1. Iared W, da Silva EM, Iared W, Macedo CR. Esthetic perception of changes in facial profile resulting from orthodontic treatment with extraction of premolars: A systematic review. *The Journal of the American Dental Association*. 2017 Jan 1;148(1):9-16.
2. Anderson jp, joondeph dr, turpin dl. A cephalometric study of profile changes in orthodontically treated cases ten years out of retention. *The Angle orthodontist*. 1973 Jul;43(3):324-36.
3. Tweed CH. Indications for the extraction of teeth in orthodontic procedure. *American journal of orthodontics and oral surgery*. 1944 Aug 1;30(8):405-28.
4. Kocadereli I. Changes in soft tissue profile after orthodontic treatment with and without extractions. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2002 Jul 1; 122(1):67-72.
5. Finnoy JP, Wisth PJ, Boe OE. Changes in soft tissue profile during and after orthodontic treatment. *Eur J Orthod*. 1987;9(1):68-78.
6. Xu TM, Liu Y, Yang MZ, Huang W. Comparison of extraction versus nonextraction orthodontic treatment outcomes for borderline Chinese patients. *Am J Orthod Dentofacial Orthop*. 2006 May; 129(5):672-7.
7. Konstantonis D. The impact of extraction vs nonextraction treatment on soft tissue changes in Class I borderline malocclusions. *Angle Orthod*. 2012 Mar; 82(2):209-17.
8. Aniruddh Yashwant ,Comparative evaluation of soft tissue changes in Class I borderline patients treated with extraction and nonextraction modalities. *Dental Press J Orthod*. 2016 Jul-Aug;21(4):50-9.
9. Saelens NA, De Smit A. Therapeutic changes in extraction versus non-extraction orthodontic treatment. *Eur J Orthod* 1998; 20:225-36.
10. Oliver BM. The influence of lip thickness and

strain on upper lip response to incisor retraction. *Am J Orthod* 1982;82:141-9.
11. Drobocky OB, Smith RJ. Changes in facial profile during orthodontic treatment with extraction of four first premolars. *Am J Orthod Dentofacial Orthop*. 1989 Mar;5(3):220-30.
12. Bravo LA. Soft tissue facial profile changes after orthodontic treatment with four premolars extracted. *Angle Orthod*. 1994;64(1):31-42.
13. Battagel JM. The relationship between hard and soft tissue changes following treatment of Class II division I malocclusions using Edgewise and Fra¨nkel appliance techniques. *Eur J Orthod*. 1990;12:154–165.
14. Paquette DE, Beattie JR, Johnston LE Jr. A long-term comparison of non extraction and premolar extraction edgewise therapy in ‘‘borderline’’ Class II patients. *Am J Orthod Dentofacial Orthop*. 1992;102:1–14.
15. Yogosawa F. Predicting soft tissue profile changes concurrent with orthodontic treatment. *Angle Orthod*. 1990 Fall;60(3):199-206.
16. Jacobs JD. Vertical lip changes from maxillary incisor retraction. *Am J Orthod*. 1978 Oct;74(4):396-404.
17. Wholley CJ, Woods MG. The effects of commonly prescribed premolar extraction sequences on the curvature of the upper and lower lips. *The Angle Orthodontist*. 2003 Aug;73(4):386-95.
18. Lim HJ, Ko KT, Hwang HS. Esthetic impact of premolar extraction and nonextraction treatments on Korean borderline patients. *Am J Orthod Dentofacial Orthop*. 2008;133: 524–531.
19. Erdinc AE, Nanda RS, Dandajena TC. Profile changes of patients treated with and without premolar extractions. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2007 Sep 1;132(3):324-31.
20. Luppanapornlarp S, Johnston Jr LE. The effects of premolar-extraction: a long-term comparison of outcomes in “clear-cut” extraction and nonextraction Class II patients. *The Angle Orthodontist*. 1993 Dec;63(4):257-72.
21. Janson G, dos Santos PB, Garib DG, Francisconi MF, de Oliveira Baldo T, Barros SE. Interlabial gap behavior with time. *Journal of the World Federation of Orthodontists.* 2013 Dec 1;2(4):e175-9.